2022 Sustainability Progress Report

Building a better tomorrow

August 2023

SOUNDTRANSIT

At a glance

ENVISION PLATINUM
CERTIFICATION
on the Downtown Redmond Link Extension

AVOIDED NEARLY
194K
TONS
of greenhouse gas emissions
FROM PASSENGERS TAKING TRANSIT

SAVED NEARLY
$1M
ANNUALLY FROM
48 *ongoing resource efficiency projects*

Accelerated the development of *affordable housing by approving* **3** *advancing construction on* ***450 units*** *of affordable housing.*

IMPLEMENTED
RACIAL EQUITY TOOLKITS
ON 2 PROJECTS

REDUCED
OPERATIONAL GREENHOUSE GAS EMISSION BY
24%
compared to
2018 BASELINE

AWARDED
$9.3M
FTA GRANT TO PURCHASE

battery electric buses for the ***Stride Bus Rapid Transit program***

DIVERTED
73%
of waste
IN AGENCY HEADQUARTERS BUILDINGS

Sustainability helps further our mission by providing affordable, safe, and environmentally friendly regional transportation options.

Sustainability

Sustainability at Sound Transit

Sustainability is at the core of our mission: connecting more people to more places to make life better and create equitable opportunities for all. Investing in transit builds a better future by supporting a clean environment, connecting communities, and fostering vibrant economies. Sound Transit supports regional sustainability by continuing to serve the riders who depend on transit the most.

Sustainability helps further our mission by:

- Providing affordable, safe regional transportation options.
- Promoting stewardship that conserves the planet's natural environment.
- Supporting community prosperity by helping residents and businesses save time and money.

Sound Transit uses a robust Environment and Sustainability Management System to guide our environmental and sustainability initiatives. The system holds the agency accountable for controlling potential environmental impacts, achieving annual environmental and sustainability targets, and demonstrating continual improvement in performance.

Since 2007, Sound Transit's ESMS has maintained international ISO 14001 certification for accountability in controlling environmental impacts, maintaining environmental compliance, and demonstrating enhanced sustainability performance.

About this report

This year's Annual Progress Report summarizes our efforts to achieve long- and short-term environmental and sustainability goals, and it highlights the ongoing challenges of the agency's recovery to a new normal.

Analysis and performance measures in this report focus on how Sound Transit uses its resources — including through capital project planning and design — and how we operate our services. (This report does not include resource use from agency construction.)

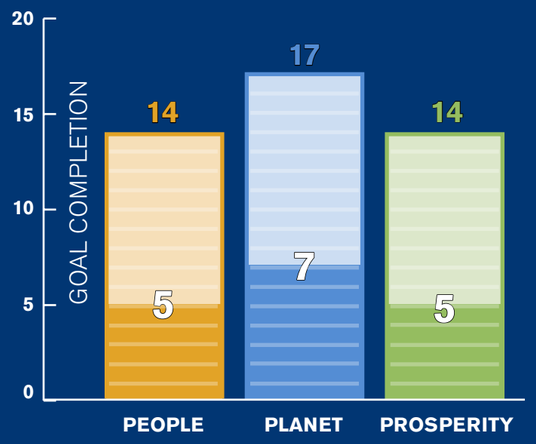
The pandemic dramatically altered travel patterns throughout the region, as clearly reflected in ridership and resource use trends. While 2020 and 2021 data illustrated an abrupt break from the agency's improving efficiency and sustainability performance over the past five-plus years, 2022 data shows the agency's ongoing recovery and adjustment to a new normal.

The data in this report focuses on the metrics set by Sound Transit's Sustainability Plan, which established short-term goals for the years 2019 through 2024 and extended the agency's long-term goals to 2050. The year 2018 serves as the baseline for the agency's short-term goals and key performance indicators.

These metrics reflect multiple reporting frameworks and standards, including those used by other transit agencies and local governments, as well as the American Public Transportation Association's Sustainability Commitment and The Climate Registry.

International Organization for Standardization
ISO
14001:2015

Sustainable Business Practices and strategies will be integrated throughout the Sound Transit organization, including planning, designing, constructing, and operating existing and new transit systems and facilities. Executive Order No. 1, 2007



Progress toward the Sustainability Plan

This report includes both data on Sound Transit's operational performance from a resource-use perspective and progress on short-term goals in the Sustainability Plan. As of 2022, **Sound Transit has completed 17 of the plan's 45 short-term goals, and we're on track to complete the majority of these by 2024.**

 # TOTAL **# COMPLETED**

COLLABORATIVE

Transit is sustainable

Sound Transit's regional system expansion is essential to Central Puget Sound's sustainable future. We promote sustainability by developing and operating regional transit and fostering smart growth. The agency's focus on rebounding ridership to pre-pandemic levels is also an integral component of our sustainability goals.

Capital expansion will help more people travel affordably and reliably on environmentally friendly buses and trains throughout the region's growing communities. Expanding mass transit services benefits everyone by offering a less carbon-intensive means of travel, which decreases air and water pollution. Plus, transit also:

SAVES TIME **SAVES FUEL** **IMPROVES AIR QUALITY** **SAVES MONEY**

Key accomplishments

We achieved a number of important sustainability accomplishments over the last year that leverage social, environmental, and financial benefits for the region's future. In 2022, Sound Transit:

- Was awarded for having the "Most Transformative" Sustainability Plan by the FTA's Healthy Planet Challenge.
- Received Envision Platinum certification for the Downtown Redmond Link Extension.
- Avoided nearly 194,000 tons of greenhouse gas emissions from passengers taking transit, nearly four times the amount of emissions the agency produced from operations. This is more than double the amount of emissions avoided than in 2021.
- Saved nearly $1M from 48 new and existing sustainability and resource efficiency projects.
- Accelerated the development of affordable housing by approving three new sites for mixed use TOD development and advancing construction on 450 units of affordable housing.

Continual improvement

Sound Transit is committed to improving sustainability performance year after year. In the next year, we'll focus our sustainability efforts on:

- Continuing planning efforts to decarbonize the agency's revenue fleet, prioritizing internal and partner agency coordination.
- Prioritizing green procurement by reducing the use of materials with high carbon content.
- Demonstrating our policy commitment to reducing emissions from transportation by participating in the Washington State Clean Fuel Standard and other policy mechanisms.
- Preparing for the expansion of publicly accessible electric vehicle charging at Sound Transit parking facilities per compliance with the Washington State's new building code.
- Prioritizing strategies to address the greenhouse gas emissions that are difficult to reduce, including refrigerants and facilities' natural gas use.

People

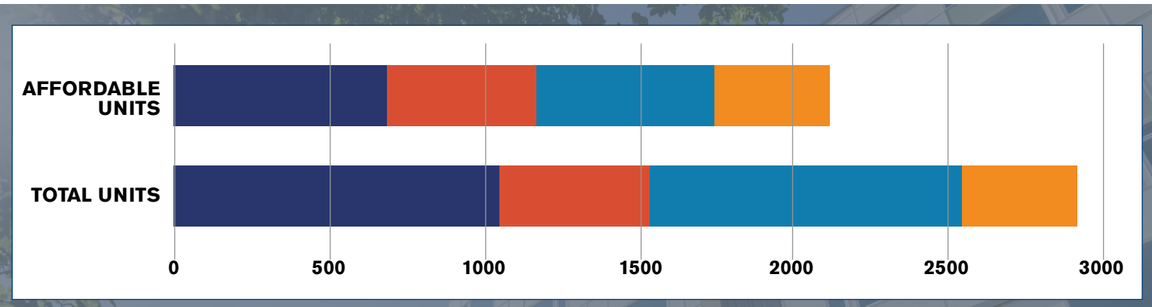
Helping people move freely, affordably and healthily by providing regional transit service

Supporting affordable housing

Sound Transit's Transit-Oriented Development program creates diverse, vibrant, and mixed-income communities around transit. To achieve these outcomes, the agency offers its surplus properties — those acquired for building and operating the transit system but no longer provide a transit use — as development opportunities for affordable housing or other developments with public benefits.

In 2022, TOD at Sound Transit was advanced by:

- Welcoming residents to new affordable homes at the Cedar Crossing building at the Roosevelt Station TOD site.
- Partnering with the Washington State Housing Finance Commission on aligning $200M in the Commission's bond financing for affordable housing built on ST TOD sites.
- Approving three new sites for mixed use TOD developments: Overlake Village, Kent Des Moines, and U District stations.
- Advancing construction on more than 450 units of affordable housing, including units for families, formerly unhoused seniors, and LBGTQ+ seniors.
- Awarding three former Sound Transit surplus properties as home building sites to the Rainier Valley Affordable Housing Initiative via the City of Seattle.



Key performance indicators

Dollars contributed to affordable housing revolving loan fund:
$4 million

Staff trained in equity and inclusion:
95% of staff completed Equal Employment Opportunity Training.
78% of staff completed Implicit Bias Training.
48% of staff completed Inclusion Training.
11% of staff completed Microaggressions in the Workplace Training.

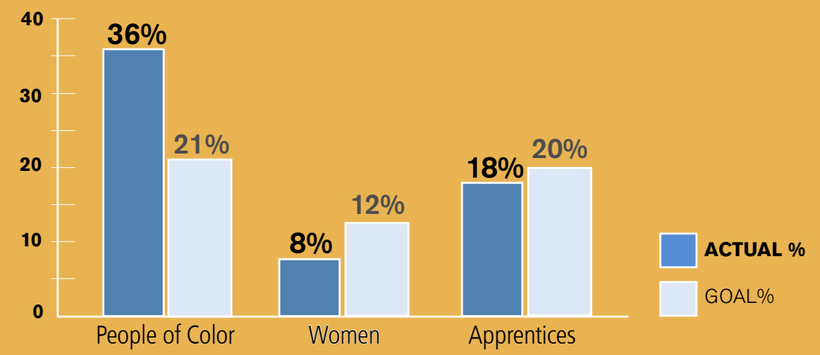
Total hours worked on ST job sites in 2022:
36% by people of color.
8% by women.
18% by apprentices.

Staff who have earned sustainable professional accreditations:
47 Envision Sustainability Professionals.
11 LEED Accredited Professionals.
12 other sustainability certifications.

Employing Puget Sound residents

Sound Transit's capital expansion projects bring construction employment opportunities to communities across the Puget Sound region.

In 2022, Sound Transit's construction projects directly employed more than 8,737 people who worked 3.8 million hours and earned $198 million in wages.



People

Social equity addressed and implemented as an agency value

Implementing an agency Racial Equity Toolkit (RET)

In Feb. 2022, Sound Transit's Office of Civil Rights, Equity, and Inclusion officially published the agency's first Racial Equity Toolkit. They spent much of the year building staff and stakeholder awareness about the tool and training for implementation via a broad internal stakeholder process. By the end of the year, two major capital projects Everett Link Extension and Tacoma Dome Link Extension were implementing RETs, with several more slated for 2023. The tool requires thinking beyond the traditional topics of "scope, schedule, and budget" for large infrastructure projects. CREI and the agency emphasize that the value of the RET is as much about the process as it is about the product; stakeholders should expect that implementing a RET often means grappling with topics and issues that may elicit uncertainty and discomfort.

The tool requires thinking beyond the traditional topics of "scope, schedule, and budget" for large infrastructure projects.

Positioning Sound Transit to implement anti-racist values

In the spring of 2022, the Office of Civil Rights, Equity, and Inclusion procured a racial equity consultant to help support the development and implementation of Sound Transit's Anti-Racist Strategy. PRR (the primary consultant) and Racing to Equity (R2E) spent much of the year uncovering the agency's current employee profile, including demographic data, employee surveys, and a variety of other related material. In the late summer/early fall they also conducted a round of listening sessions with a small number of Sound Transit employees. This culminated in a summary report that will be used to inform the next phase which is development of the ARS work plan.

Sound Transit received the "Most Transformative" award for developing a plan demonstrating sustainability throughout the agency, including fleets, facilities, and operations.

All staff champion sustainability

Receiving national recognition for promoting sustainability at all levels

The FTA launched the Sustainable Transit for a Healthy Planet Challenge to encourage transit agencies to take bold action to further reduce GHG emissions from public transportation to support national GHG reduction goals. The challenge called on transit agencies to develop climate, sustainability, or electrification or zero-emission transition plans that included strategies with measurable goals to achieve GHG emission targets. On Earth Day 2022, FTA recognized the exemplary efforts of 10 transit agencies that are reducing greenhouse gas emissions with unique strategies that work for their systems and communities. Sound Transit received the "Most Transformative" award for developing a plan demonstrating sustainability throughout the agency, including fleets, facilities, and operations.

U.S. Department of Transportation
Federal Transit Administration
SUSTAINABLE TRANSIT FOR A HEALTHY PLANET

Planet

Promoting stewardship to conserve the planet's natural environment

Increasing environmental benefits

Sound Transit and our partner services provide tangible environmental benefits for the region's growing communities. For example, when residents choose transit instead of driving alone, they reduce air and water pollution.

Passengers taking Sound Transit avoided nearly 194,000 tons of greenhouse gas emissions annually. This represents a 59% increase in avoided emissions since 2021, illustrating a ridership rebound as the region recovers from the COVID-19 pandemic. In 2022, Sound Transit avoided nearly four times the amount of emissions the agency produced, compared to nearly six times the emissions produced in 2019.

The avoided emissions are equivalent to:

Burning nearly 22 million gallons of gasoline.

Providing electricity for nearly 38,000 homes for a year.

The carbon captured by growing more than three million tree seedlings for 10 years.

Key performance indicators

Greenhouse gas emissions:
24% reduction

Criteria air pollutants:
Particulate matter: 22% decrease | volatile organic compounds: 15% decrease nitrogen oxides: 1% decrease | carbon monoxides: 1% increase | sulfur oxides: 10% decrease

kWh renewable energy production:
265,161 kWh produced in 2022

Energy used in facilities built before 2018:
0% reduction

Number of fineable environmental compliance violations:
0 violations in 2022

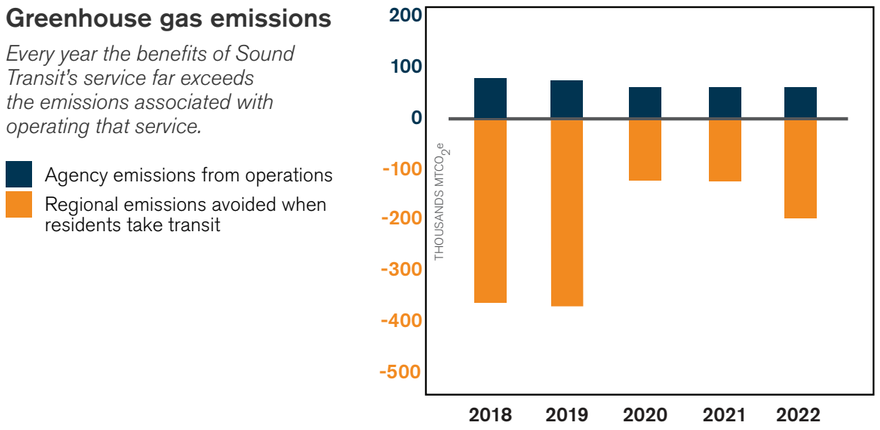
Agency water use:
12% decrease

90%

of Sound Transit's electricity comes from carbon free sources

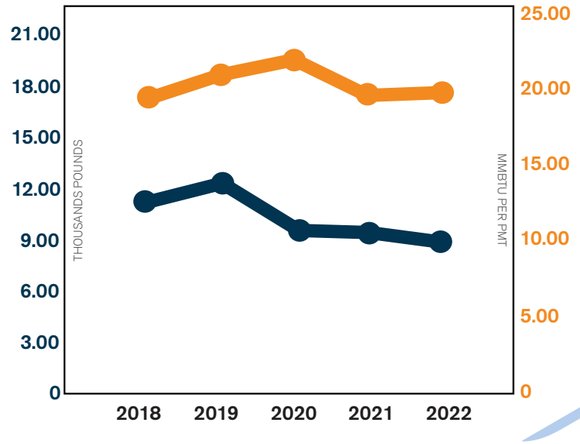
Greenhouse gas emissions

Every year the benefits of Sound Transit's service far exceeds the emissions associated with operating that service.



Reducing air pollution

Updates to Sounder engines and phasing out older ST Express diesel buses have reduced Sound Transit's air pollution.



Planet

Achieve carbon-free operations

Investing in electric buses

In 2022, the Biden-Harris administration announced over $1.6 billion in bipartisan infrastructure law funding to nearly double the number of clean transit buses on roads in the United States. Sound Transit received $9.3 million for our Stride Bus Rapid Transit program. This funding will support our purchase of electric buses and associated charging equipment for new bus rapid transit service along the SR 522 corridor. “With today’s awards, we’re helping communities across America — in cities, suburbs, and rural areas alike — purchase more than 1,800 new buses, and most of them are zero-emission,” said U.S. Transportation Secretary Pete Buttigieg.

“Funded through President Biden’s Bipartisan Infrastructure Law, this announcement means more good jobs for people across the country, cleaner air in our communities, and more affordable and reliable options to help people get where they need to go.”

U.S. Transportation Secretary Pete Buttigieg

Committing to sustainable infrastructure

The Institute for Sustainable Infrastructure (ISI) awarded Sound Transit’s Downtown Redmond Link Extension it’s highest award - Envision Platinum - for sustainable infrastructure for improvements to the social, economic, and environmental conditions of its community. The project is the first transit project in the Pacific Northwest to receive verification by ISI and only the ninth Envision Platinum-rated transportation project in the nation. Envision is an internationally recognized rating system for sustainable infrastructure projects and addresses a wide range of project factors such as quality of life, management, planning, materials, energy, water, environmental impacts, emissions, and resilience. “We are proud of this achievement and look forward to continuing our work to provide environmentally friendly public transit that connects people throughout the Puget Sound region to where they live, work, and play” Said Kimberly Farley, Sound Transit’s chief system officer at the time.

ENVISION™

“Doing this well on the first attempt at Envision verification is a testament to Sound Transit’s long and deep commitment to excellence in sustainability,”

Kimberly Farley, former ST chief system officer

Enhance ecosystem functions

Quantifying ecosystems services

Sound Transit is a committed steward of the natural environment. One area where the agency is beginning to evolve our approach and understanding is through the measurement of ecosystem services. Ecosystem services refer to the various benefits that humans derive from the natural environment such as monetary assets like timber, water, fish, and soil, as well as nonmonetary benefits like recreation, water purification, and flood management. Measuring ecosystem services is a useful way to understand the contributions of ecosystem functions and consider environmental, social, and cultural benefits.

Sound Transit is working towards developing tools that will allow us to assess what services our projects provide for communities. In the future, this can allow us the guide future project actions to maximize public benefits beyond what is required by regulatory agencies and permits.

Prosperity

Support local economic prosperity by enabling residents and businesses to save time and money

Saving taxpayer dollars

Sound Transit invests in sustainability — and sustainability pays us back. Over the past 10+ years, we've invested in many projects that save natural resources and save the agency money. These projects include operational improvements like using electric wayside power units on Sounder trains to reduce the idling of diesel engines and upgrading inefficient lighting to LEDs. This sample of the agency's resource conservation projects saved Sound Transit nearly $1,000,000 in 2022 alone, and over $7.5 million over project lifetimes.

$652K Fleet Upgrade Projects

$47K Irrigation Projects

$48K Facilities Upgrade Projects

$22K Solar Installations

$217K LED Lighting Upgrade Projects

	2022 Savings	Savings to date
Fleet upgrade projects	$651,866	$5,673,312
Irrigation projects	$46,951	$378,985
Facilities upgrade projects	$47,925	$255,534
Solar installations	$21,921	$58,874
LED lighting upgrade projects	$217,242	$1,179,041

More details on sustainability cost savings are located in Appendix B.

Key performance indicators

Staff trained in emergency preparedness
1,050 staff trained in core safety training.
173 staff attended safety lunch and learns.
187 staff trained in a non-revenue vehicle safe driving course.
38 staff certified in First Aid/CPR/AED.
85 staff trained in Stop The Bleed.

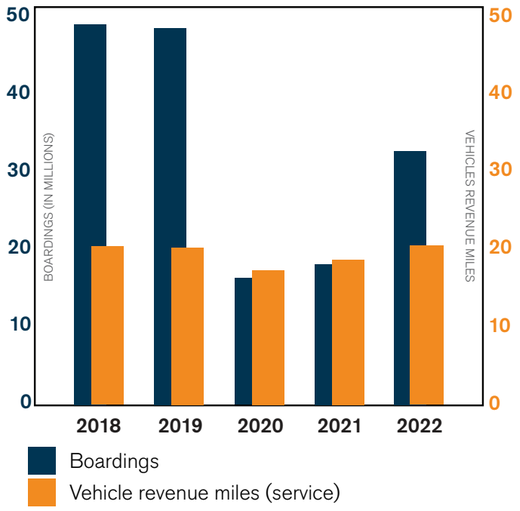
Projects that include Climate Change Vulnerability Assessments:
100% of eligible projects.

Waste diverted
35%

Percentage of and increase in dollar value of new procurements that include green methods and features:
10% of procurements included green methods | 121% decrease in dollar value from 2018, 70% increase in dollar value from 2021.

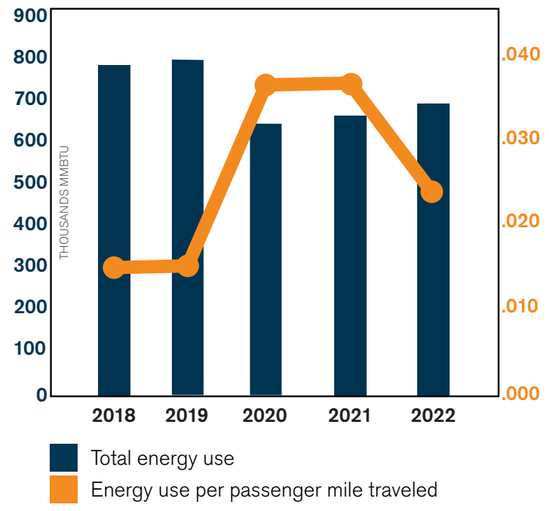
Boardings and service

Sound Transit carried more passengers per service levels every year, until the disruption of the COVID-19 pandemic.



Revenue fleet energy use

All services services continued to operate efficiently by carrying passengers further while using fuel more efficiently, until the disruption of the COVID-19 pandemic.



Prosperity

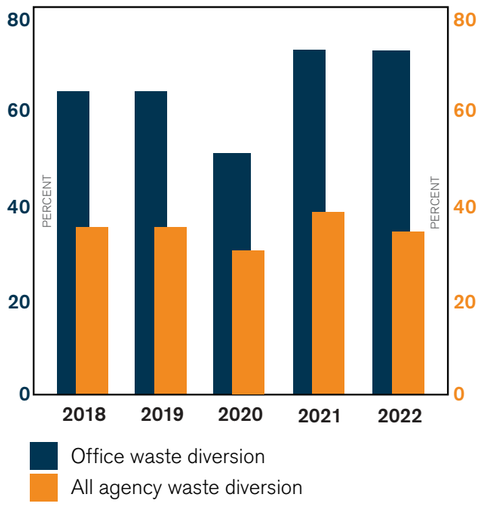
Build resilience to climate change and natural or humanmade disasters

Integrating resiliency into agency design requirements

Sound Transit initiated its effort to integrate climate vulnerability considerations into the revision of its design requirements. Sustainability staff worked with subject matter experts across the agency to ensure that the design requirements address future heat, localized flooding, and sea level rise impacts into the agency's design standards. This approach ensures that the agency not only prepares for the current climate, but also makes the agency resilient to the increased occurrence of climate change impacts that are expected in our region.

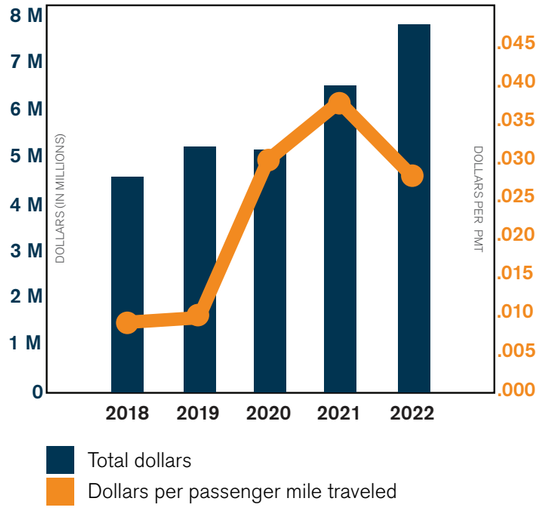
Waste diversion

Sound Transit continues to maintain a high waste diversion rate in our office buildings and is exploring ways to increase waste diversion from service operations.



Utility costs

Sound Transit is a growing agency, but has been able to keep costs per level of service relatively steady, until the disruption of the COVID-19 pandemic.



Maximize operational efficiency

Pursuing continuous process improvements

Sound Transit believes in the continuous improvement power of management systems. In addition to the agency's long standing Environmental and Sustainability Management System, we are also pursuing asset management systems and safety management systems. In 2022 Sound Transit made progress on these developing management systems through a number of advancements:

- Our CEO Julie Timm signed Sound Transit's Asset Management Policy, which establishes a commitment to safety, reliability and sustainability by preventing assets from deteriorating below a state of good repair and taking a whole lifecycle approach to strategically manage assets and asset knowledge.
- The Safety team developed an ISO 45001 and FTA Safety Management System Implementation Plan to prioritize and address high-risk items in pursuit of ISO certification.

2022 Sustainability Targets

Sound Transit Year in Review

People

- ☐ Create potential delivery approaches for joint-development projects integrated with new park-and-ride facilities. *
- ☑ Support the opening of more than 600 affordable rental housing units.
- ☐ Finalize sustainability guidelines for transit-oriented development projects. *
- ☑ Begin anti-racist strategy work plan implementation.
- ☑ Launch the Racial Equity Toolkit and Equitable Engagement Tool implementation plan.
- ☑ Host five anti-racism workshop cohorts for ST employees.
- ☑ Enhance training and technical opportunities to prepare DBEs to lead ST contracts.
- ☐ Define options for implementing flexible access improvements for delayed parking facilities. *
- ☐ Expand the permit parking program's authority to include daily permits. *
- ☑ Establish agencywide sustainability networking and educational forum for all staff.
- ☑ Identify key DECM and PSO staff to pursue sustainability professional accreditations.
- ☑ Refine hybrid workforce standards and conduct trainings on hybrid best practices.
- ☑ Launch self-service resources for IT service desk.
- ☑ Support retirement readiness program.
- ☐ Launch Passenger Information Management System. *
- ☑ Set up job-description platform with revised ADA requirements.

Planet

- ☑ Propose carbon-free operational design standards for new facilities.
- ☑ Draft a roadmap for achieving carbon-free operations for facilities and fleets by 2050.
- ☐ Develop zero-emissions implementation plan for agency bus fleets. *
- ☑ Evaluate the potential to use renewable diesel fuel in agency bus fleets.
- ☑ Increase green building standard to LEED Gold for new facilities.
- ☑ Set low-carbon concrete requirements for three new facilities.
- ☑ Refine the cataloguing of ecosystem services to be evaluated for ST mitigation sites.
- ☑ Survey SBE/DBE contractors' equipment inventory to determine air quality emissions.
- ☑ Evaluate two new green building standards.
- ☑ Clarify and document Tribal engagement protocols for capital projects.

** These partially completed targets are on track for finalization in 2023*

2022 Sustainability Targets

Sound Transit Year in Review

Prosperity

- ☐ Initiate Snohomish County Threat Hazard Identification Risk Analysis. *
- ☐ Revamp staff emergency preparedness plans for hybrid workforce. *
- ☑ Standardize climate vulnerability assessment implementation for capital projects.
- ☑ Incorporate sustainability into non-system expansion projects by including screening criteria in the Portfolio Review Board and department-level pre-screening processes, as appropriate.
- ☑ Update and approve Asset Management policy.
- ☑ Prioritize and address high-risk items for safety management system ISO certification.
- ☐ Implement centralized hazard database to streamline safety and security hazard management. *
- ☑ Draft operating plans to support LEED EBOM certification at Union Station.
- ☑ Expand the Green Procurement program to include all staff.
- ☑ Embed sustainability into the evaluation criteria for all Architecture and Engineering and Qualifications-Based Construction procurements.
- ☑ Develop and implement the Procurement & Contracts Division electronic contract library for all agency access.

** These partially completed targets are on track for finalization in 2023*

2023 Environmental and Sustainability Targets

— Supporting people, planet and prosperity

People

- ☐ Identify resources and partnership opportunities to restore a stream on Sound Transit's transit-oriented development property next to Lynnwood Transit Center.
- ☐ Support a minimum of five staff in earning new LEED and Envision credentials.
- ☐ Enhance employee wellness benefits with expanded support for mental and physical health.
- ☐ Launch Talent Guard, career path, succession management and employee career profile initiatives.

Planet

- ☐ Create a sustainability dashboard to track operational greenhouse gas emissions.
- ☐ Purchase first battery electric truck for the agency's non-revenue vehicle fleet.
- ☐ Begin bus procurement for Stride, the agency's first battery electric bus fleet.
- ☐ Generate revenue from electric transit service under Washington state's Clean Fuel Standard.
- ☐ Design Stride's Bus Base North to operate as a fossil fuel-free facility.
- ☐ Conduct zero-emission locomotive feasibility study for Sounder rail service.
- ☐ Identify and evaluate ecosystem services on a representative Sound Transit project.
- ☐ Begin water use reduction feasibility study by reviewing landscape standards that are less water dependent.
- ☐ Initiate LEED Platinum and Fitwel feasibility studies for the West Seattle and Ballard Link Extensions & Operations and Maintenance Facility South.
- ☐ Update environmental commitment tracking system tools for improved efficiency and effectiveness.
- ☐ Implement the Preliminary Environmental Site Assessment for due diligence studies on the West Seattle and Ballard Link Extensions and Everett Link Extension.
- ☐ Review and revise Environmental Corrective Action Report system to enhance construction contractor environmental compliance.
- ☐ Establish framework for agency Stormwater Management Program.

Prosperity

- ☐ Reevaluate King and Pierce counties' Threat Hazard Identification Risk Analysis.
- ☐ Reevaluate floor captain responsibility for a hybrid work environment.
- ☐ Integrate climate resiliency into design requirements.
- ☐ Identify and prioritize construction materials where the carbon content can be reduced.
- ☐ Meet 2023 competitive grant assumptions, including at least one sustainability grant.
- ☐ Evaluate renewable diesel feasibility for use in emergency power generation at Sound Transit facilities.
- ☐ Build model to determine transportation efficiencies in labor deployment management.
- ☐ Hire an Energy Manager and develop a strategic plan for compliance with the Washington Clean Buildings Performance Standard.
- ☐ Begin incorporating climate change adaptation strategies in Tacoma Link Asset Management Plan.
- ☐ Educate all staff about green procurement options for micro-purchases.
- ☐ Finish Procurement, Contracts and Agreements e-file library development and migrate required legacy contracts and Agreements to the new system.

Appendix A – 2022 Sustainability Inventory

Executive Summary

This Appendix presents key data snapshots from Sound Transit's 2022 Annual Sustainability Progress Report and identifies resource use patterns compared to earlier years of performance. The report evaluates 2022 performance metrics, as well as performance data trends over multiple years.

While service levels in 2022 were close to pre-pandemic levels, and ridership increased from 2020–2021, total passenger trips and passenger miles traveled remained well below 2019 levels. Though more workers returned to the office, the prevalence of remote and hybrid workplaces appears to be a durable trend moving forward.

Please note that any statements about resource use trends and metrics in this appendix are made in absolute terms unless explicitly stated otherwise; normalized trend analyses and metrics will be explicitly labeled as such (e.g., greenhouse gas emissions *per* passenger miles traveled).

The main takeaways from the year include:

- Total ridership increased 81% from 2021 and more than doubled from 2020, while remaining one-third lower than pre-pandemic levels.
- Energy use increased, due to the first full year of light rail service on the Northgate Link Extension and increased usage at East Link maintenance facilities in preparation for that line's opening. Resource use increases were both absolute and normalized, as ridership levels have not returned to pre-pandemic levels.
- Total operational greenhouse gas (GHG) emissions increased 3% from 2021 to 2022, with the opening of the Northgate Link Extension and the East Link maintenance facilities and associated increases in energy use.

Key findings in resource use and efficiency include:

- Ridership increased substantially in 2022 from 2020–2021 pandemic lows, with combined passenger miles traveled (PMT) across all modes increasing 59% from 2021 and unlinked passenger trips ("boardings") increasing 81%. Sound Transit's vehicle revenue miles (VRM) increased by 10% in 2022.
- Total agency energy use (electricity, fleet fuel, and natural gas usage) increased 6% from 2021 to 2022, while total energy use decreased 3% relative to 2018. Increased energy use in 2022 reflected increases in service levels, the opening of new facilities, and cooler weather conditions.
    - Revenue fleet energy use increased 6% from 2021 to 2022, which was less than the 10% increase in vehicle revenue miles operated from the previous year.
    - From 2021 to 2022:
        - Sounder commuter rail service increased fuel consumption by 8%.
        - Link light rail increased traction power consumption by 39%, reflecting increased service levels, a full year of service on the Northgate Link Extension (which opened in October 2021), and increased usage at the Central and East Link maintenance facilities.
        - ST Express reduced fuel consumption by 4%.

    - Total electricity consumption increased by 22% from 2021 to 2022, largely driven by the increases in electricity for Link Light Rail traction power.
    - Meanwhile, facility energy consumption increased 5% from 2021 to 2022, with expanded use at new facilities and an increase in heating degree days.
    - Facility natural gas consumption increased by 37%, largely due to increases at the Central Link and East Link maintenance facilities, along with a 5% increase in heating degree days.

- Water use decreased by 9% from 2021 to 2022, while cooling degree days (an indicator of hot weather, potentially linked to landscape irrigation needs) decreased by 6%.

- Tons of waste diverted from landfill increased 12% from 2021 to 2022, though waste generation also increased, resulting in a waste diversion rate of 35%, a decrease from the previous year.

Notes on Appendix A: This document illustrates resource use trends over time from two baseline years: **2011**, when Sound Transit adopted its first Sustainability Plan, and **2018**, to reflect substantial system expansion and the baseline for key performance indicators established in the 2019 Sustainability Plan update. It also shows year-over-year changes from the preceding inventory year, 2021. In the following graphs, solid bars indicate total emissions, resource use, and resource costs. The trend lines show the normalized resources, either per PMT or per VRM, over time. Most graphs include seven years of data to illustrate trends.

Ridership and Level of Service

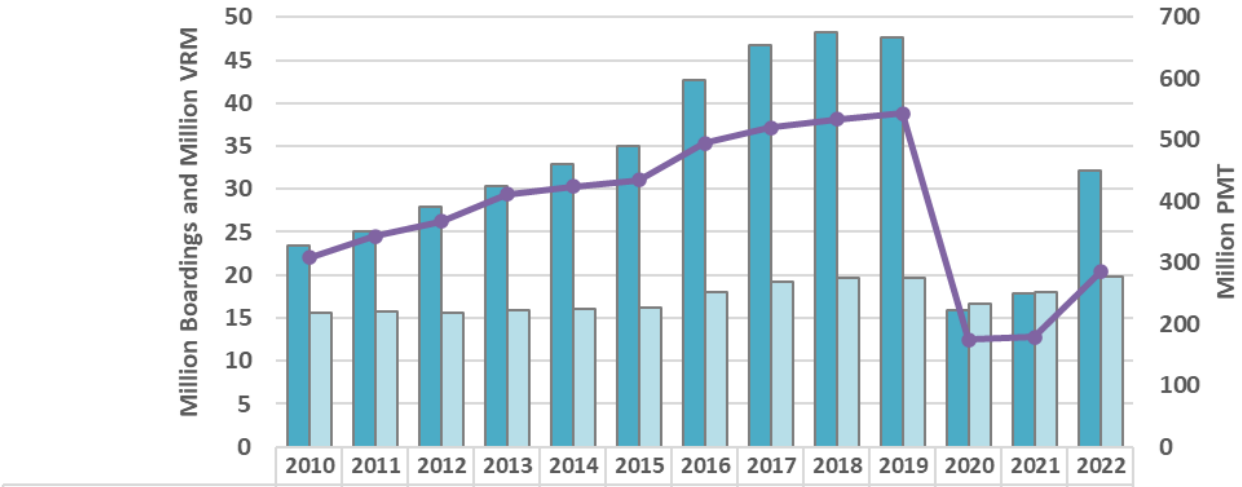
- Since the 2011 baseline, ridership measured in boardings (unlinked passenger trips) has increased by 28%, and vehicle revenue miles are up by 26%.
- Relative to 2018, boardings are down by 33%, while VRM is about the same.
- From 2021 to 2022, boardings increased 81%, and vehicle revenue miles increased 10%.

Ridership has important implications for resource use. As Sound Transit's network expands, the agency anticipates total resource use will increase. To account for the growth of Sound Transit's service network while also interpreting resource efficiency trends over time, the Sustainability Inventory normalizes data by the level of service provided by the agency (vehicle revenue miles or VRM), the number of unlinked passenger trips (boardings or UPT) and the volume and distance of overall ridership (passenger miles traveled or PMT).

Boardings and PMT have generally increased year-over-year throughout the agency's history. However, 2020 saw the agency's first steep decline in ridership due to the COVID-19 pandemic. With the exception of Tacoma Link, VRM in 2020 fell significantly across all services, and boardings fell across all services. These levels increased only slightly in 2021.

In 2022, ridership and service levels rose substantially from 2020–2021, but ridership remains well below pre-pandemic levels. The opening of the Northgate Link Extension in October 2021 boosted Link Light Rail service levels and ridership. Figure 1 below shows the trends of boardings, vehicle revenue miles, and passenger miles traveled over time.

Figure 1. Boardings, Vehicle Revenue Miles, and Passenger Miles Traveled by Year

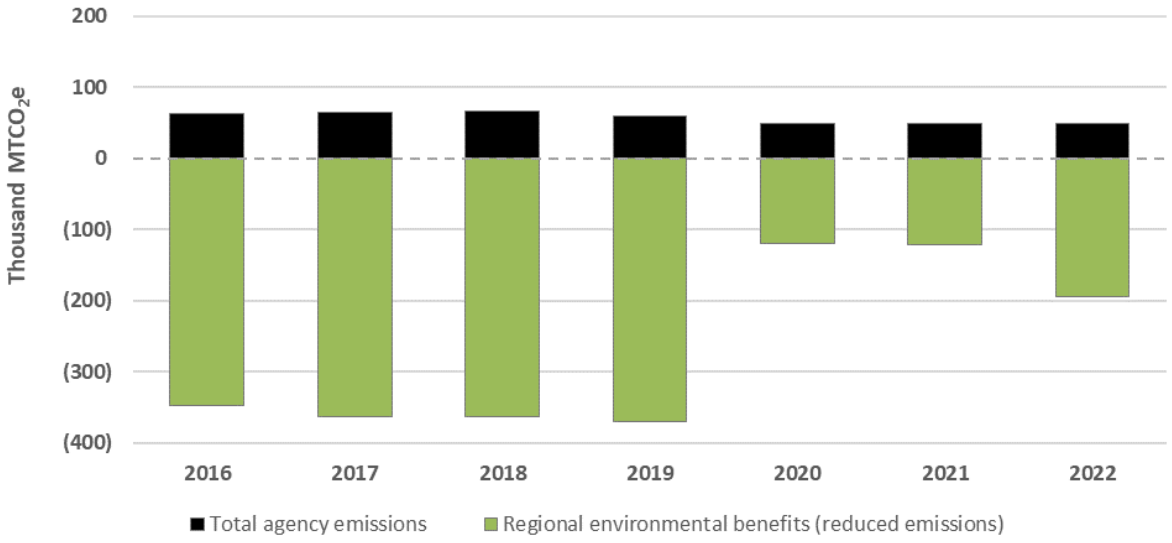


	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Boardings (millions)	23.4	25.0	28.0	30.3	32.9	34.9	42.7	46.8	48.2	47.6	15.9	17.8	32.1
VRM (millions)	15.6	15.7	15.6	15.9	16.0	16.2	17.9	19.1	19.7	19.6	16.6	18.0	19.8
PMT (millions)	308.6	343.2	367.7	411.8	424.6	435.2	494.6	520.0	534.2	543.7	174.6	179.2	284.7

Regional Environmental Benefit

Increased transit use reduces regional environmental impacts from passenger vehicles. As more people choose transit over driving, fuel consumption and greenhouse gas (GHG) emissions are reduced. Avoided GHG emissions are a measure of the regional environmental benefit enabled by transit. Sound Transit employs a 2018 methodology developed by the American Public Transportation Association (APTA) to account for emissions avoided due to transit ridership, measured in carbon dioxide equivalent (CO_2e), as shown in Figure 2 and Table 1.

Figure 2. Regional Greenhouse Gas Emissions (CO_2e) Avoided by Sound Transit Services



As seen in Figure 2 above, even though Sound Transit has had significantly lower ridership since the start of the pandemic in 2020, its transit services still displace more GHG emissions than they emit from operations. For every ton of GHG emissions Sound Transit produced from operations in 2022, the region avoided nearly 3.9 tons of emissions through the benefits of transit. The regional environmental benefits shown in green in Figure 2 include the benefits from people taking transit instead of driving (mode shift) and reduced emissions associated with denser land use patterns supported by transit. Prior to the pandemic-induced decline in ridership, these benefits were 5 to 6 times the agency's operational emissions, in black.

Table 1. Regional Greenhouse Gas Emissions (CO_2e) Avoided by Sound Transit Services, 2022

Regional metric tons CO_2e Reduced		
Mode Shift Benefits	Land-Use Benefits	Total Benefits
36,425	157,231	193,655
Avoided Emission Ratios – CO_2e units reduced in the region per unit of CO_2e from Sound Transit operations		
Mode Shift Benefits	Land-Use Benefits	Total Benefits
0.73	3.13	3.86

The definitions for each of the identified types of benefits are below:

- **Mode shift benefits** measure the reduced GHG emissions (amount avoided) resulting from shifting from one mode of transportation (single occupancy vehicle) to another (transit), measured on a PMT basis.
- **Land use change benefits** measure the reduced carbon emissions due to the denser land use patterns supported by transit systems.

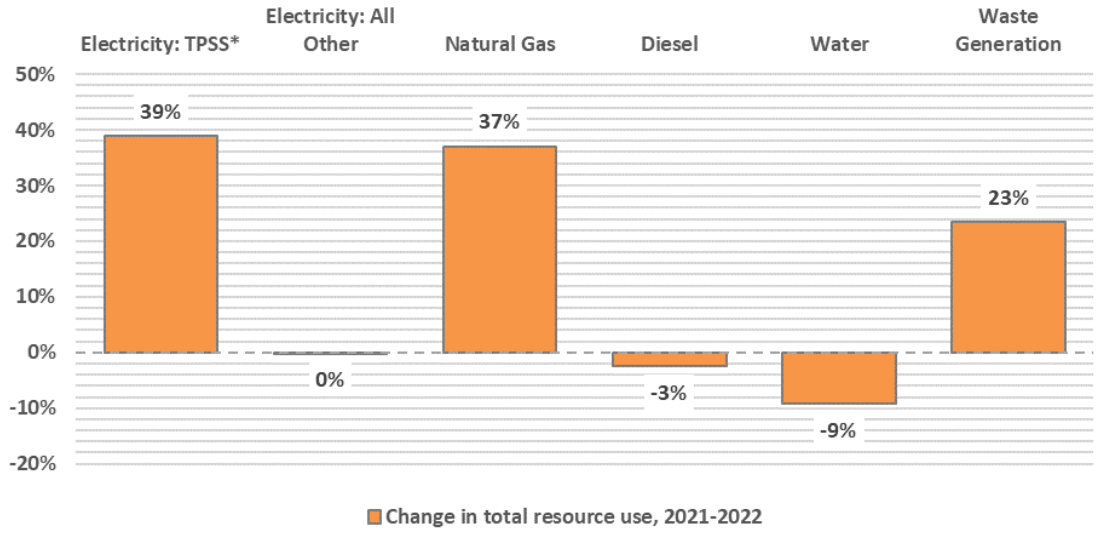
Resource Use

Total agency resource use has generally increased over time, reflecting the expansion of the Sound Transit system. Most increases in resource use have been directly in line with increased service levels and use of revenue fleet vehicles.

In response to public health restrictions and diminished ridership during the COVID-19 pandemic, Sound Transit reduced service levels significantly in 2020, and resulting resource use declined across most metrics. As ridership and service levels rose in 2021 and 2022, resource use rebounded. The opening of new Link light rail service to Northgate as well as the East Link maintenance facilities increased resource consumption. Figure 3 below shows the change in total resource use from 2021 to 2022. The following subsections provide more details on energy use by transit service (fleet), non-revenue vehicles, and facilities; subsequent sections address air pollutant emissions, water use, waste generation, and costs.

- Total traction power electricity consumption (for Link light rail propulsion) increased 39% from 2021 to 2022, while facility electricity consumption remained stable. Since 2018, traction power has increased 69%, and facility electricity usage has increased 13%. Traction power electricity consumption has increased 331% since 2011, while facility electricity consumption has increased 30% during that time. (Note that for stations that do not have separate electricity meters, their energy use has typically been included with traction power since 2020, though prior inventories may categorize these accounts as customer facilities.)
- Total agency diesel consumption declined by 3% from 2021 to 2022. Diesel consumption is down 19% since 2018 and down 12% relative to the 2011 baseline.
- Facility natural gas consumption increased 37% from 2021 to 2022, largely due to increases at the Central Link and new East Link maintenance facilities. Heating degree days, a measure of how cold it was during the heating season, increased 5% from the previous year. Facility natural gas consumption has increased 77% since 2018 and increased 194% since 2011.
- Total water use decreased by 9% from 2021 to 2022, while cooling degree days (an indication of hot weather) decreased by 6%. Water use has decreased by 12% since 2018 and decreased 7% relative to the 2011 baseline.
- Waste generation (recycling, compost, and waste to landfill) increased 23% from 2021 to 2022. Waste generation has decreased 9% since 2018 and decreased by 17% from the 2011 baseline. The diversion rate (recycling and compost as percentage of total waste generation) in 2022 was 35%, down from 39% in 2021. Diversion at office buildings, where the majority of agency staff work, was much higher than the agencywide rate, at 73% in 2022.

Figure 3. Change in Total Resource Use Over Time, 2021-2022



Fleet Energy Use

- Since the 2011 baseline, fleet energy use (including ST Express buses, Sounder commuter rail, Link light rail traction power, and non-revenue vehicles) has increased by 14%, with substantial expansions in service.
- Relative to 2018, fleet energy use has decreased by 6%.
- From 2021 to 2022, total fleet energy use increased by 6%.
- Per vehicle revenue mile, fleet energy use has declined 3% since 2021 and 10% since 2011.
- Fleet energy use per PMT decreased 33% from 2021 to 2022, as ridership returned from pandemic lows, though it remained 37% higher than the 2011 baseline. In 2022, total fleet energy use increased somewhat over 2021 levels, while energy use per PMT and per VMT decreased, though they have not returned to pre-pandemic levels.

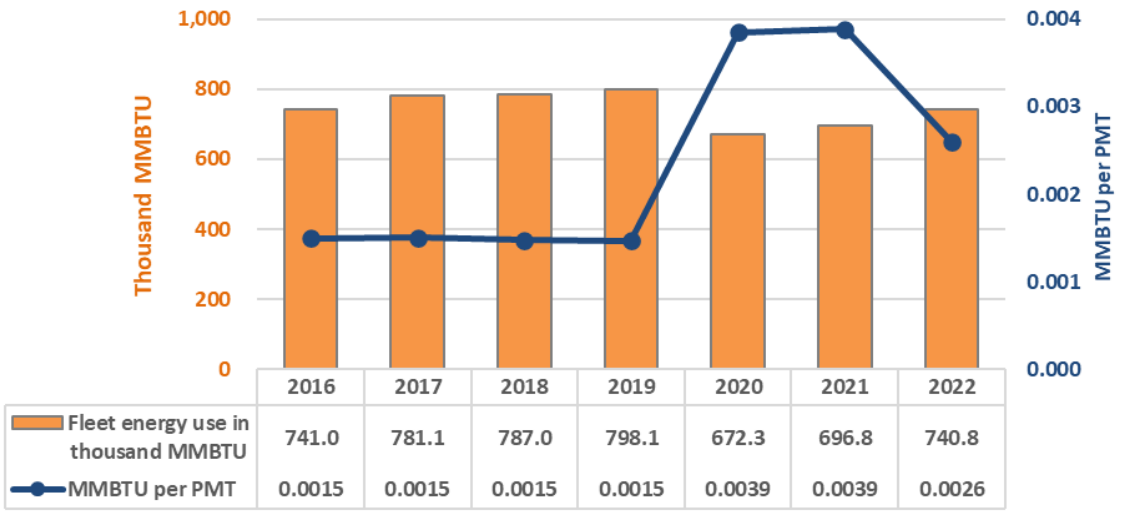
Prior to the COVID-19 pandemic, fleet energy use (in MMBTU) across Sound Transit's three modes—ST Express bus, Sounder commuter rail, and Link light rail—had been increasing slowly over time as more service was provided. Service became more efficient per PMT as system ridership grew faster than level of service (VRM). Starting in 2020, pandemic effects led to reversed revenue fleet resource consumption trends as ridership and service levels both declined, resulting in lower absolute energy use but higher energy use per PMT.

Fleet Energy Use by Mode. In 2022:

- Traction power electricity use for Link light rail increased 39% from 2021, increased 69% from 2018, and increased 331% since 2011.
- Diesel fuel use for Sounder commuter rail was up 8% from 2021 and up 18% from 2011 levels, with increased service. Sounder fuel use decreased 5% from 2018.
    - Starting in March 2020, Sounder reduced service levels and suspended special event service (e.g., for sporting events). Service levels have been increased since that time to nearly 90% pf pre-pandemic levels.
    - Note that replacement "bus bridge" service is now categorized with ST Express (including for previous years), rather than Sounder, per updated guidance.
- Diesel fuel consumption for ST Express buses decreased 4% from 2021, decreased 22% from 2018, and decreased 16% from 2011 levels.
    - The composition of the ST Express fuel mix has changed over time. Compressed natural gas (CNG) used in ST Express buses has increased from 6% of total ST Express fleet energy consumption in 2011 to 14% in 2022, as the result of a growing prevalence of CNG buses in the Pierce Transit-operated portion of the ST Express fleet.
    - In 2022, diesel buses showed reduced energy consumption by 7% from 2021 levels, while CNG buses had increases of 19%.
    - Although using CNG instead of diesel fuel reduces total GHG emissions and most criteria air pollutant emissions, including particulate matter (PM) and NO_x, CNG use does increase carbon monoxide (CO) emissions. (Air pollutants are discussed starting on page A11.)

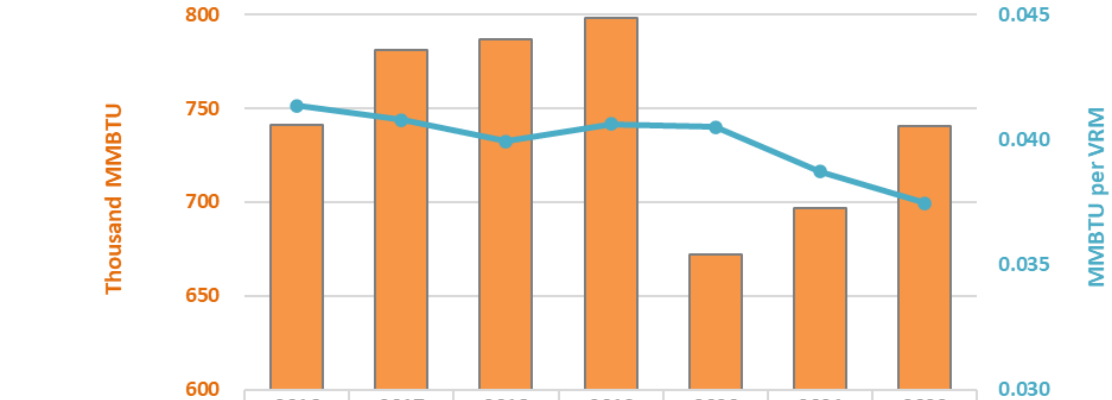
Figure 4 and Figure 4 below show the trends in fleet energy use over time. Table 2 below shows the change in energy use by mode, as well as the change in efficiency (fuel use normalized by PMT and VRM for each mode).

Figure 5. Revenue Fleet Energy Use (Normalized by Passenger Miles Traveled)



	2016	2017	2018	2019	2020	2021	2022
Fleet energy use in thousand MMBTU	741.0	781.1	787.0	798.1	672.3	696.8	740.8
MMBTU per PMT	0.0015	0.0015	0.0015	0.0015	0.0039	0.0039	0.0026

Figure 6. Revenue Fleet Energy Use (Normalized by Vehicle Revenue Miles)



	2016	2017	2018	2019	2020	2021	2022
Fleet energy use in thousand MMBTU	741.0	781.1	787.0	798.1	672.3	696.8	740.8
MMBTU per VRM	0.0414	0.0408	0.0399	0.0406	0.0405	0.0387	0.0375

Table 2. Change in Energy Use by Mode, 2021-2022

Mode	% Change in Total Energy Use	% Change in Energy Use per PMT	% Change in Energy Use per VRM
Sounder Commuter Rail (diesel)	+8%	-37%	-6%
ST Express Buses (diesel and CNG)	-4%	-22%	+1%
Link light rail traction power (electricity)	+39%	-26%	+3%

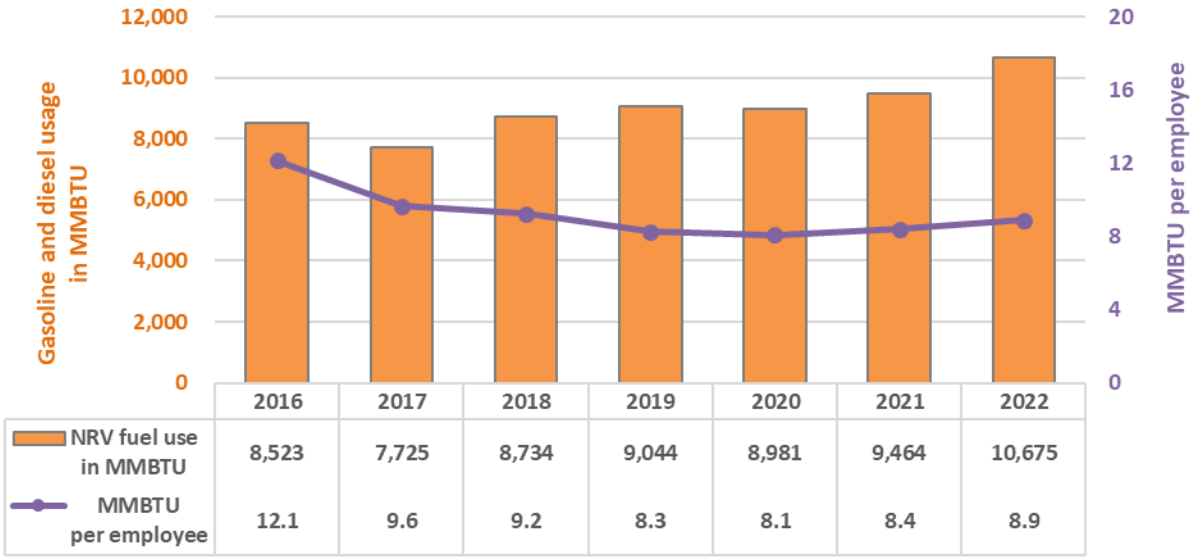
Note: Mode energy use is normalized by PMT and VRM specific to each mode.

Non-Revenue Vehicle (NRV) Fleet Energy Use

- From the 2011 baseline, non-revenue vehicle fleet energy use has increased by 34% overall but decreased by 41% per employee, as staff size as significantly grown.
- Since 2018, NRV energy use has increased 22% but decreased 4% per employee.
- From 2021 to 2022, NRV energy use increased by 13% overall, while increasing by 6% per employee. This is due to more employees resuming to normal office use and non-revenue fleet use.

Energy use for the agency's non-revenue fleet has grown moderately over time, as the NRV fleet and employee headcount has grown, as shown in Figure 6. While the agency's headcount has increased every year, contributing to more driving of NRV fleet vehicles, Sound Transit has also purchased more hybrid and electric vehicles, helping to reduce per-mile and per-employee energy use and air pollutant emissions. The agency encourages employee use of carpooling or transit whenever feasible.

Figure 7. Non-Revenue Fleet Energy Use (in MMBTUs)



	2016	2017	2018	2019	2020	2021	2022
NRV fuel use in MMBTU	8,523	7,725	8,734	9,044	8,981	9,464	10,675
MMBTU per employee	12.1	9.6	9.2	8.3	8.1	8.4	8.9

Facility Energy Use

- Total facility energy use was up 45% in 2022 from the 2011 baseline and increased 21% since 2018.
- From 2021 to 2022, total facility energy use increased by 5%.
- Facilities built before 2018 increased energy consumption by 0.4% in 2022 relative to a 2018 baseline, though usage varied substantially among individual facilities, with some showing large increases (e.g., Kirkland Transit Center, Auburn Warehouse) and others showing decreases (e.g., Tacoma Link Convention Center Station, Mercer Island Park and Ride).*

As the agency has brought additional stations and facilities online, facility energy use has generally increased. October 2021 saw the opening of the 4.3-mile Northgate Link Extension, which added the U District, Roosevelt, and Northgate stations to the Link light rail network.

Although many Sound Transit facilities remained operational throughout the pandemic, many of Sound Transit's office staff worked remotely starting in March 2020. Some staff returned to the office in 2021 and more in 2022, though overall office utility consumption has remained lower than pre-pandemic levels. Sound Transit is also in the process of downsizing and consolidating its office space use.

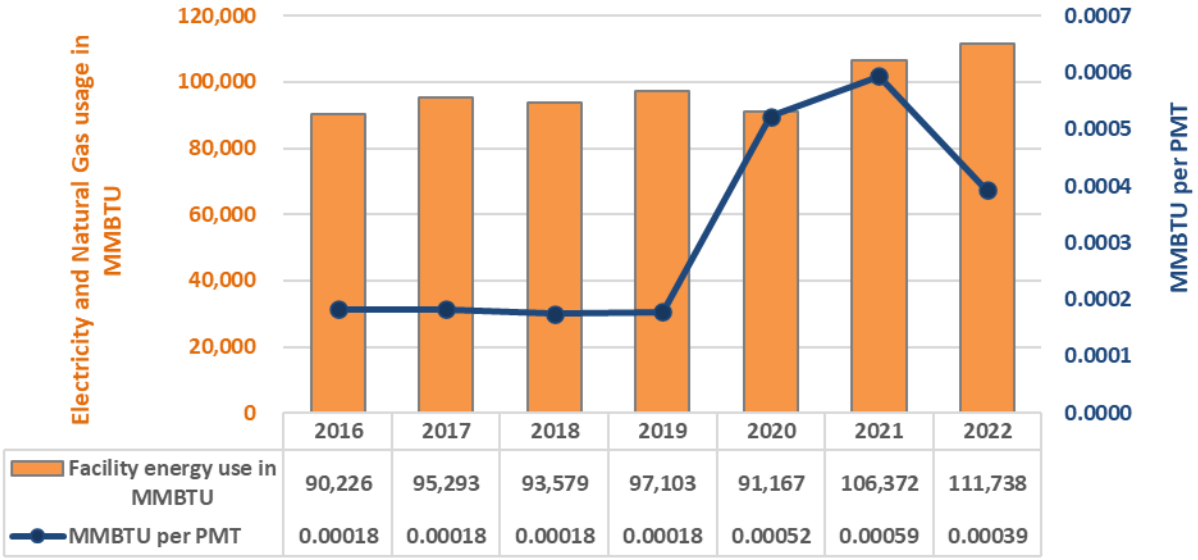
From 2021 to 2022, total facility electricity use remained essentially stable (-0.3% decrease) but varied substantially by line of business, with increases in ST Express facilities and decreases in Sounder facilities. Electricity consumption is also subject to external factors like weather. In 2022, heating degree days increased 5% in 2022 from 2021, and cooling degree days decreased by 6%.

Changes in electricity by facility type include:

- Link light rail facilities decreased electricity consumption by 1% from 2021 to 2022, even as service expanded with the first full year of service at the three new stations of the Northgate Link Extension. Traction power electricity usage increased dramatically, by 39%. (Note that some customer facilities with combined meters have been recategorized to be included with traction power.)
- Sounder facilities decreased electricity consumption 11% from 2021 to 2022.
- Across owned and leased properties, Sound Transit administrative facilities increased electricity consumption in 2022 by 5% as more employees returned to office work.
- ST Express facilities increased electricity consumption by 26%, exceeding pre-pandemic levels.

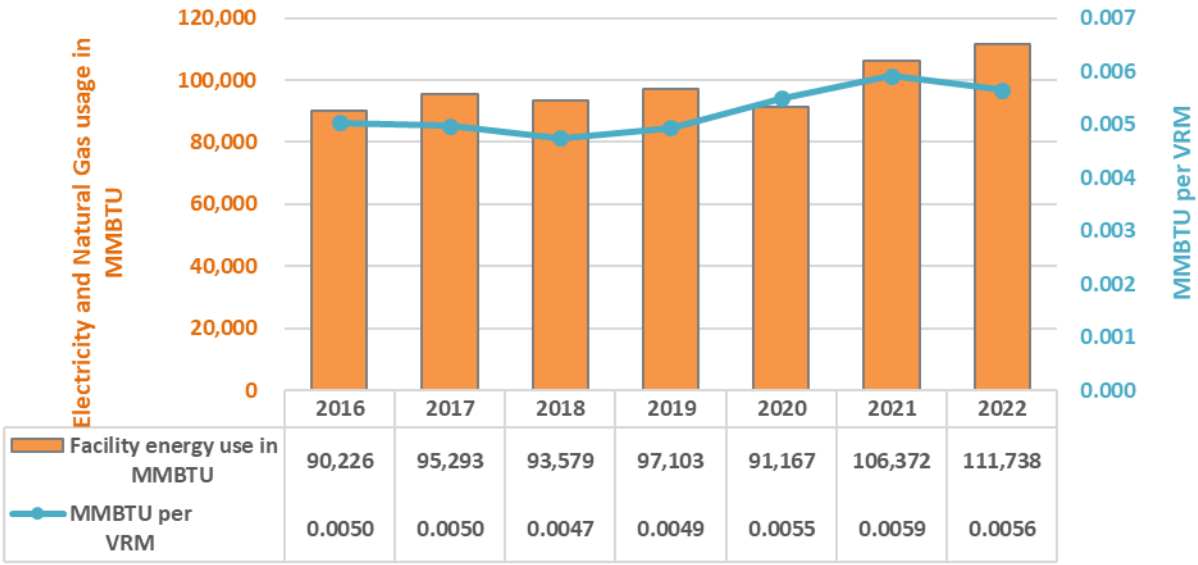
* 2019 Sustainability Plan Key Performance Indicator

Figure 8. Facility Energy Use (Normalized by Passenger Miles Traveled)



	2016	2017	2018	2019	2020	2021	2022
Facility energy use in MMBTU	90,226	95,293	93,579	97,103	91,167	106,372	111,738
MMBTU per PMT	0.00018	0.00018	0.00018	0.00018	0.00052	0.00059	0.00039

Figure 9. Facility Energy Use (Normalized by Vehicle Revenue Miles)

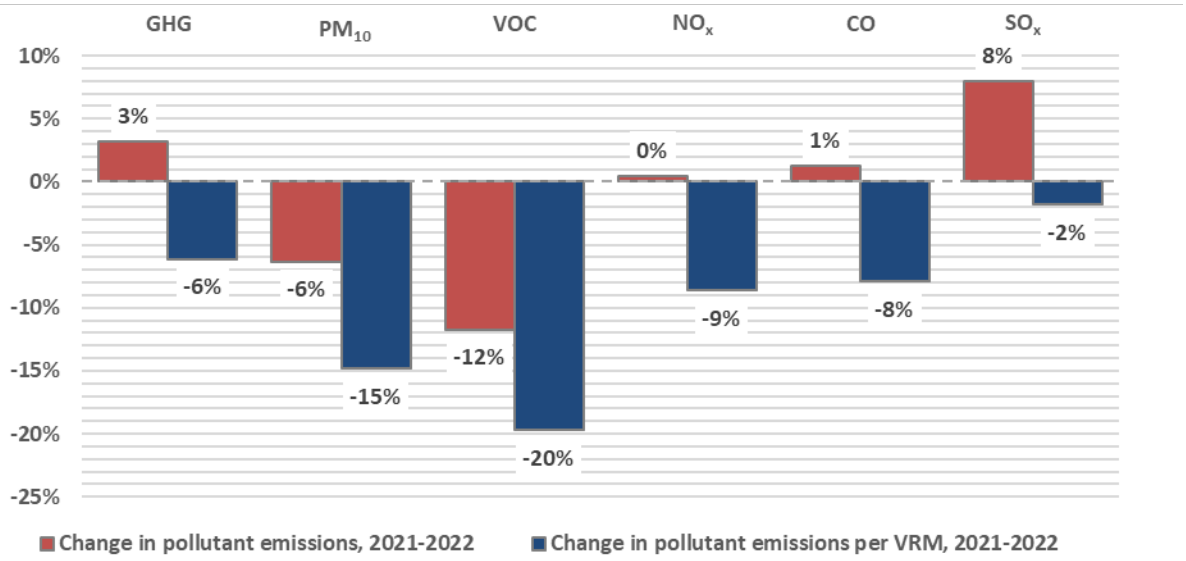


	2016	2017	2018	2019	2020	2021	2022
Facility energy use in MMBTU	90,226	95,293	93,579	97,103	91,167	106,372	111,738
MMBTU per VRM	0.0050	0.0050	0.0047	0.0049	0.0055	0.0059	0.0056

Air Pollutant Emissions

The sections below illustrate the trends in GHG emissions and criteria air pollutant emissions from Sound Transit vehicle and facility operations. Figure 9 below shows the total percentage change and the change normalized per vehicle revenue mile by pollutant type from 2021 to 2022. As noted above, agency VRM increased by 10% from 2021 to 2022.

Figure 10. Changes in Pollutant Emissions, 2021-2022; Change in Pollutant Emissions per VRM, 2021-2022



Greenhouse Gas (GHG) Emissions

- Since the 2011 baseline, total agency greenhouse gas (GHG) emissions have decreased by 17%, even with substantial growth in service over that time.
- Relative to 2018, agency GHG emissions have decreased 24%.*
- From 2021 to 2022, agency GHG emissions increased 3%, with service increases and ridership rebounding from pandemic declines.

As Sound Transit service and ridership increased from 2011 through 2019, total agency GHG emissions in metric tons CO_2 equivalent ($MTCO_2e$) remained relatively stable overall, and normalized emissions were declining as ridership and service increased. In 2020, multiple factors caused a drop in absolute agency GHG emissions and an increase in GHG emissions per PMT as ridership levels dropped, as pictured in Figure 10. Decreased service levels led to reduced fuel consumption, while the substantial drop in ridership drove normalized metrics upward. In 2022, total emissions increased 3%, while emissions normalized per PMT decreased by 35% relative to the prior year and emissions per VRM decreased by 6%.

* 2019 Sustainability Plan Key Performance Indicator

Figure 11. Agency GHG Emissions (Normalized by Passenger Miles Traveled)

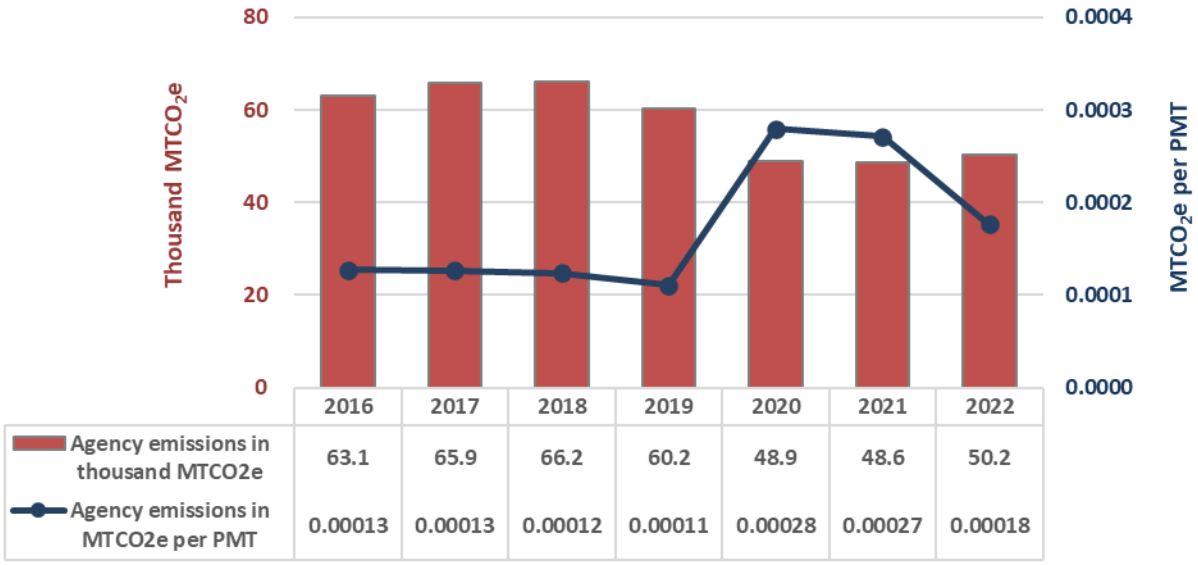


Figure 12. Agency GHG Emissions (Normalized by Vehicle Revenue Miles)

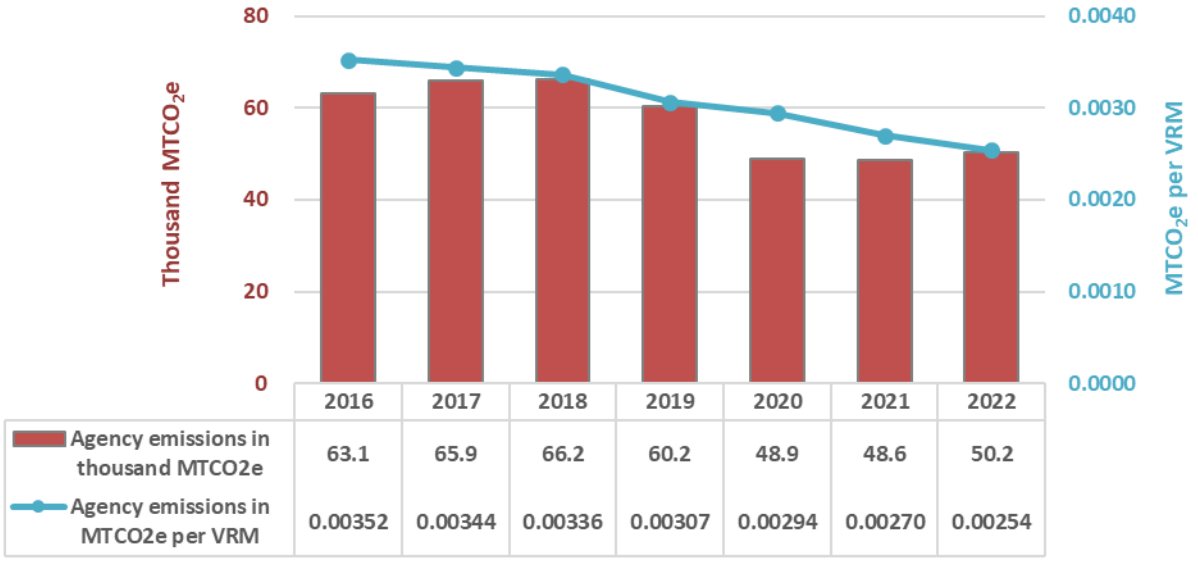
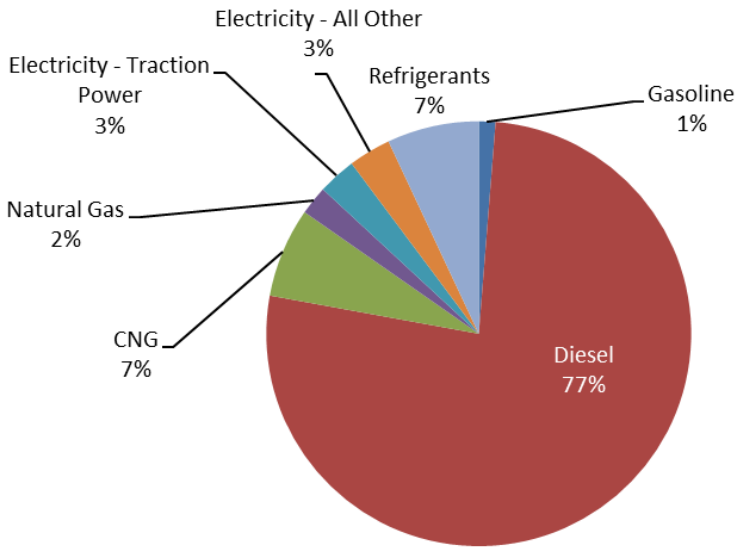


Figure 13. Greenhouse Gas Emissions (Scope 1 and 2) by Source, 2022



Criteria Air Pollutants (CAPs)

- From the 2011 baseline, total combined CAPs have decreased by 63%.
- From the 2011 baseline, all individual CAP emissions have decreased substantially (with decreases ranging from 46% to 78%), with the lone exception of SO_X, which has increased by 10% and shown greater inter-annual variability.
- Since 2018, total CAPs have decreased by 1%.
- From 2021 to 2022, total CAPs remained nearly the same.
- Contributions to CAPs varied by mode of transit, and service levels varied from 2021 to 2022.
    - VRM for ST Express Bus service decreased by 5% and Tacoma Link decreased by 19%, while VRM for Sounder Commuter Rail increased 15% and Central Link light rail increased 35%.
    - The associated changes in CAP emissions were also mixed.
    - Particulate matter (PM_{10}) decreased 6% and volatile organic compounds (VOCs) decreased 12%, while sulfur oxides (SO_X) increased by 8%.
    - NO_x and CO were similar in 2021 and 2022.

Table 3. Change in Criteria Air Pollutant Emissions

Pollutant	Change 2011–2022 (Absolute)	Change 2021–2022 (Absolute)
PM_{10}	-68%	-6%
VOCs	-75%	-12%
NO_X	-46%	0%
CO	-78%	+1%
SO_X	+10%	+8%
Total Combined CAPs	**-63%**	**0%**

Sound Transit's long-term reduction in CAP emissions has been driven by ST Express's shift from reliance on diesel buses to diesel-electric hybrids and CNG buses, toward clean electrically powered light rail, as well as general improvements in emission controls. The agency has also upgraded all Sounder commuter rail engines to reduce air pollution.

The figures below show the absolute and normalized change in PM_{10} and CO emissions over time. These criteria air pollutants are down 68% and 75% since 2011, respectively.

Figure 14. Particulate Matter (PM_{10}) Emissions (Normalized by Passenger Miles Traveled)

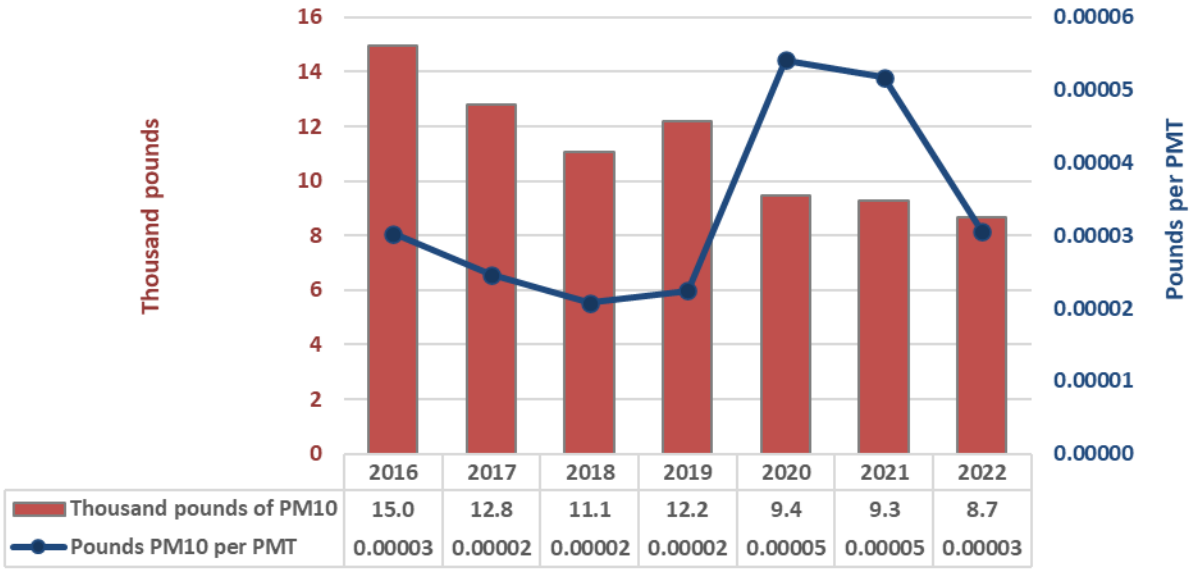


Figure 15. Particulate Matter (PM_{10}) Emissions (Normalized by Vehicle Revenue Miles)

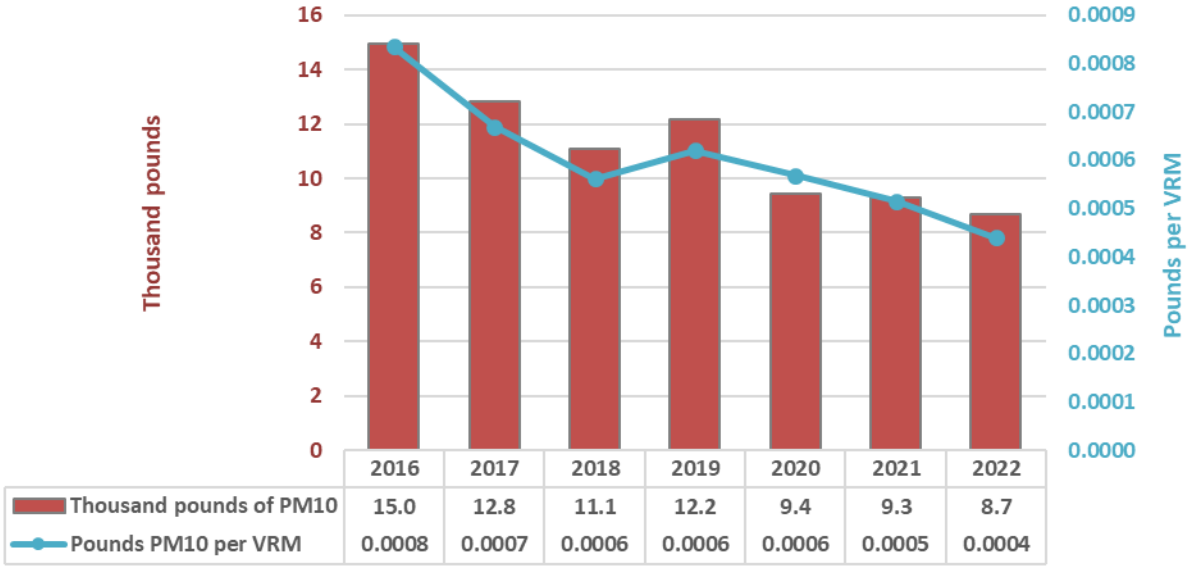
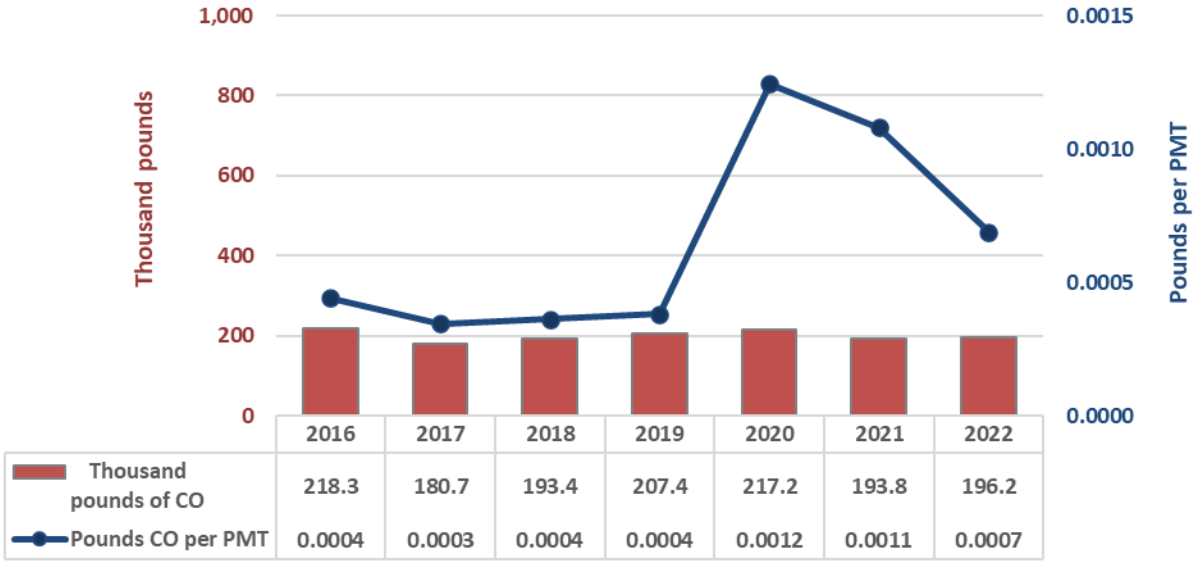
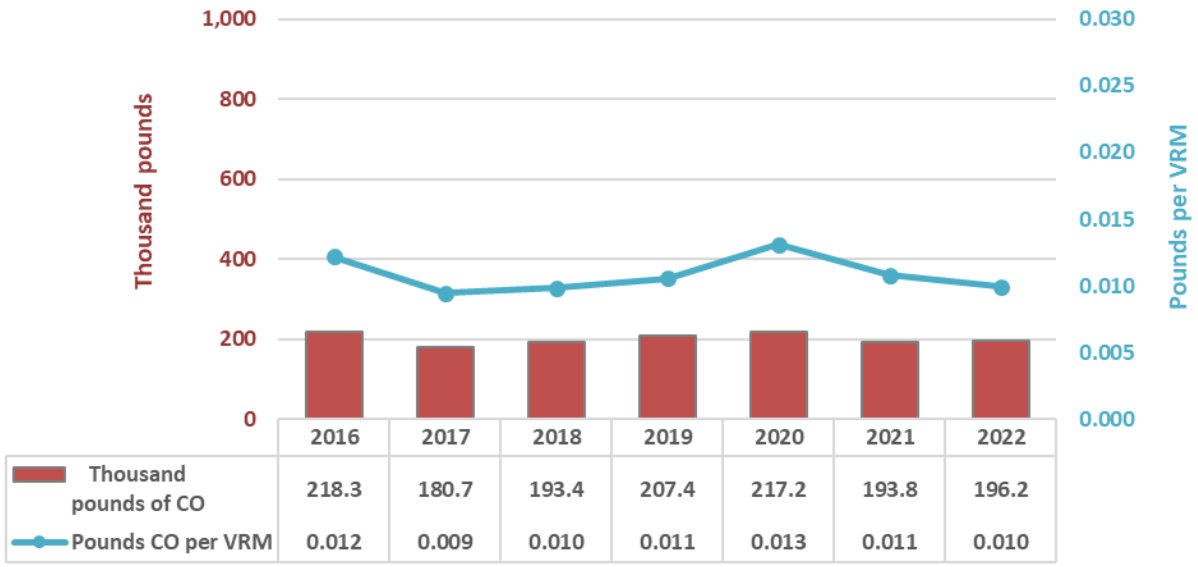


Figure 16. Carbon Monoxide (CO) Emissions (Normalized by Passenger Miles Traveled)



	2016	2017	2018	2019	2020	2021	2022
Thousand pounds of CO	218.3	180.7	193.4	207.4	217.2	193.8	196.2
Pounds CO per PMT	0.0004	0.0003	0.0004	0.0004	0.0012	0.0011	0.0007

Figure 17. Carbon Monoxide (CO) Emissions (Normalized by Vehicle Revenue Miles)

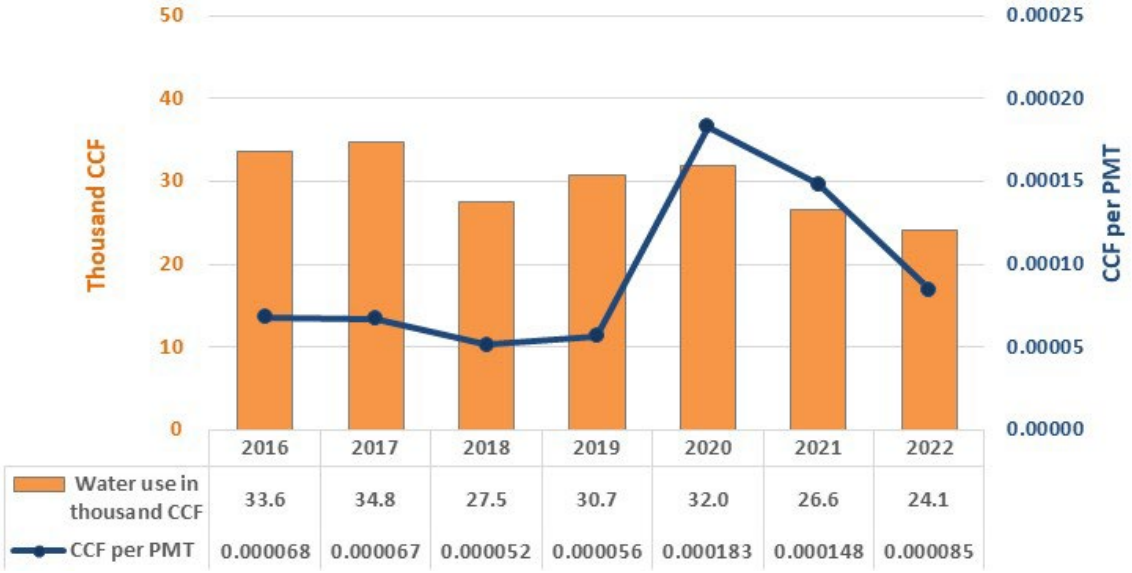


	2016	2017	2018	2019	2020	2021	2022
Thousand pounds of CO	218.3	180.7	193.4	207.4	217.2	193.8	196.2
Pounds CO per VRM	0.012	0.009	0.010	0.011	0.013	0.011	0.010

Water Use

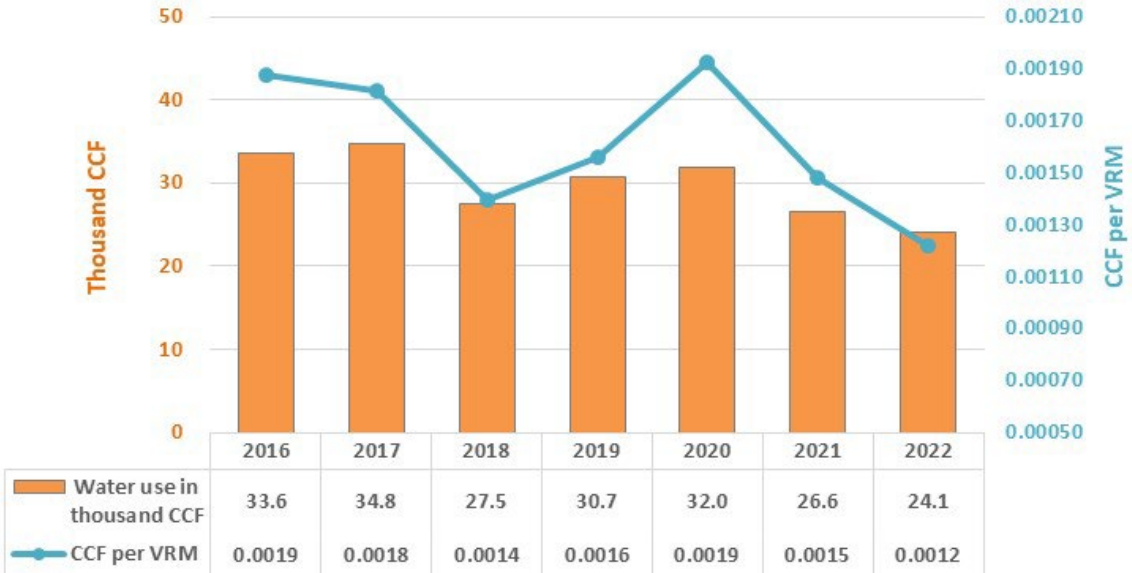
- Since 2011, total water use has decreased by 7% and decreased by 12% since 2018.
- From 2021 to 2022, water use decreased by 9%. (Some data quality corrections were made to 2021 data.)
- Total agency water use is primarily driven by landscape irrigation and is therefore variable from year to year, with weather and landscape planting cycles.
- Changes in agency water consumption from the prior year declined across all agency functions in 2022. Maintenance facilities decreased water consumption by 18% from the prior year. Customer facilities decreased consumption by 5%, and administrative facilities reduced water consumption by 9%.

Figure 18. Water Use (Normalized by Passenger Miles Traveled)



Note: 1 CCF equals 100 cubic feet, or 748 gallons

Figure 19. Water Use (Normalized by Vehicle Revenue Miles)



Waste Generation

- Since the 2011 baseline, total waste generation (including recycling, compost, and waste to landfill) has declined by 17%.
- Relative to 2018, waste generation has decreased by 9%.
- From 2021 to 2022, waste generation increased 23% (though disposal data for 2021 may be incomplete as that year shows unusually low disposal quantity, the lowest on record since 2009).
- The diversion rate in 2022 was 35%, down from 39% in 2021. Diversion at office buildings, where the majority of agency staff work, was much higher than the agencywide rate, at 73% in 2022.

While acknowledging substantial inter-annual variability, waste generation at Sound Transit facilities has declined 17% since 2011, while service levels and agency staff have increased. The total amount of garbage sent to landfill has declined 19% over the same timeframe, while the portion of recyclables and compost diverted from the landfill (diversion rate) has varied between a low of 27% in 2010 and a high of 39% in 2021. The diversion rate in 2022 was 35%.

Sound Transit has worked to improve solid waste diversion from landfill, including enhancing employee recycling education and implementing paper towel composting in the restrooms at agency offices. The shift of administrative staff to remote work in 2020 decreased office recycling and composting volumes as a component of the total agency waste stream. Recycling and composting quantities increased in 2022 over 2020–2021 levels, but they have not yet recovered to pre-pandemic levels.

- Composting quantities in 2022 increased 7% from the prior year, and recycling quantities increased 21%. However, the agency's total diversion rate during that period decreased from 39% to 35%, as waste disposal volumes grew at a higher rate of 31%, as pictured in Figure 19 below.
- Waste diversion rates for central office facilities are substantially higher than for other facilities. As depicted in Table 4 below, the diversion rate for central office facilities remained in the 60-67% range prior to the pandemic but sank to 51% in 2020 with the move of the administrative staff to remote work. In 2021 and 2022, the central office diversion rate rose to 73% as staff returned to office.

Figure 20. Waste Generation and Diversion, Tons and Diversion Rate (Percentage)

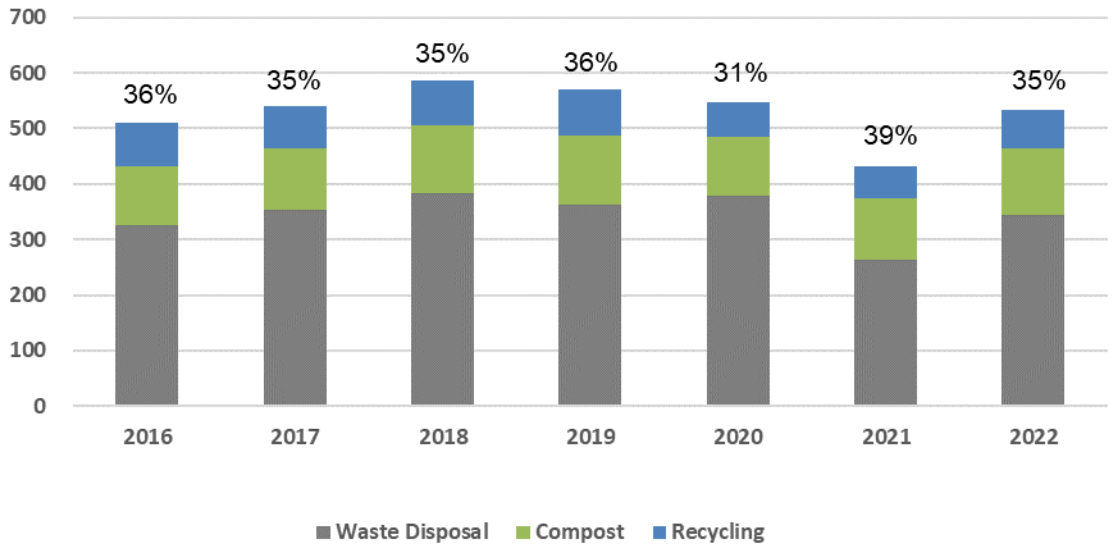


Table 4. Waste Diversion Rates by Facility Type

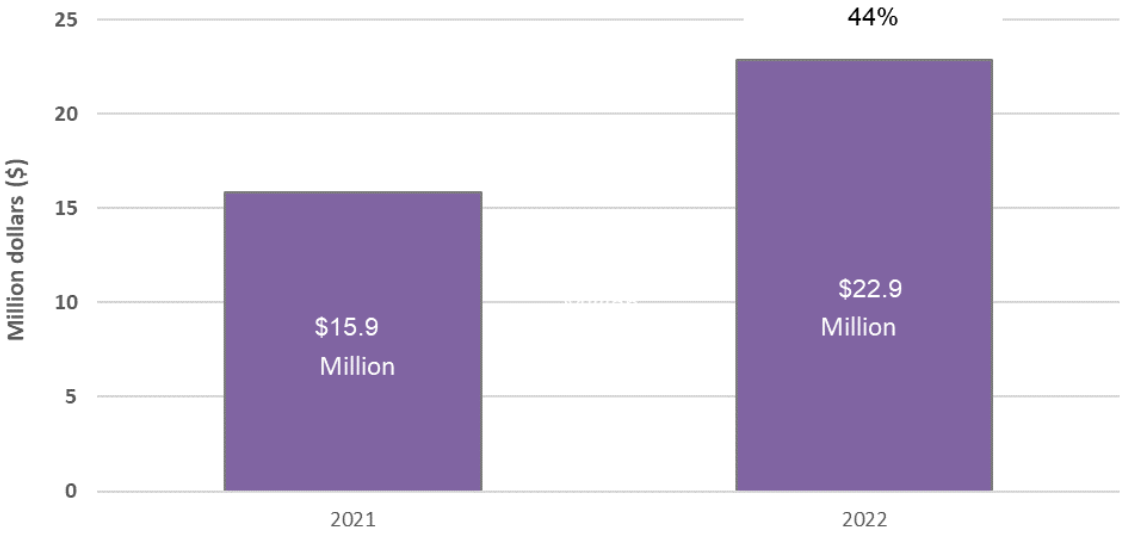
Year	Central Office	Other Facilities	Total
2016	67%	24%	36%
2017	60%	24%	35%
2018	64%	24%	36%
2019	64%	24%	36%
2020	51%	23%	31%
2021	73%	29%	39%
2022	73%	24%	35%

Fuel and Utility Expenses

- Since the 2011 baseline, combined agency utility and fuel costs (operating expenses) have increased by 42%.
- Relative to 2018, operating expenses have increased by 50%.
- From 2021 to 2022, operating expenses increased by 44%.

Resource costs across categories have generally trended upward over time. However, the pandemic initially resulted in a substantial decrease in revenue vehicle fuel expenses in 2020. With rising consumption and fuel prices, agency fuel costs in 2021 rebounded from the 2020 lows, and then in 2022 agency fuel costs increased dramatically due to much higher fuel prices. Figure 20 below shows the 44% increase in agency operating costs for fuel and utilities from 2021 to 2022. Vehicle revenue miles increased 10% in this period.

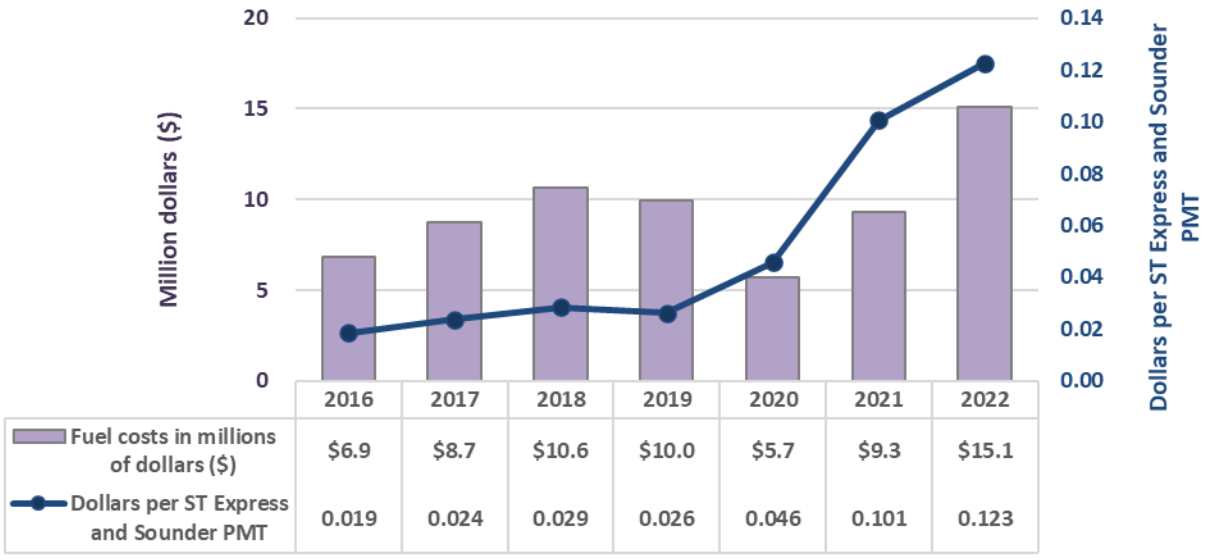
Figure 21. Fuel and Utility Expenses, 2021-2022



Transit Fuel Costs (ST Express and Sounder)

- Compared to the 2011 baseline, transit vehicle fuel costs are up 11% in total (down 1% for ST Express buses and up 46% for Sounder commuter rail).
- Relative to 2018, transit fuel costs have increased 42% (up 34% for ST Express and up 61% for Sounder).
- From 2021 to 2022, transit fuel costs increased by 61% (52% for ST Express and 85% for Sounder), driven by dramatic fuel price increases even as quantities decreased slightly.
- Transit vehicle fuel use accounted for 66% of Sound Transit's fuel and utility expenses in 2022, up from 59% in 2021.
- In 2022, transit vehicle fuel expenses accounted for roughly 4.0% of Sound Transit's operating budget, up from 2.6% the prior year.

Figure 22. Sounder and ST Express Fuel Costs (Normalized by Passenger Miles Traveled)



	2016	2017	2018	2019	2020	2021	2022
Fuel costs in millions of dollars ($)	$6.9	$8.7	$10.6	$10.0	$5.7	$9.3	$15.1
Dollars per ST Express and Sounder PMT	0.019	0.024	0.029	0.026	0.046	0.101	0.123

Figure 23. Sounder and ST Express Fuel Costs (Normalized by Vehicle Revenue Miles)

	2016	2017	2018	2019	2020	2021	2022
Fuel costs in millions of dollars ($)	$6.9	$8.7	$10.6	$10.0	$5.7	$9.3	$15.1
Dollars per ST Express and Sounder VRM	0.50	0.63	0.75	0.70	0.46	0.78	1.29

Utility Expenses

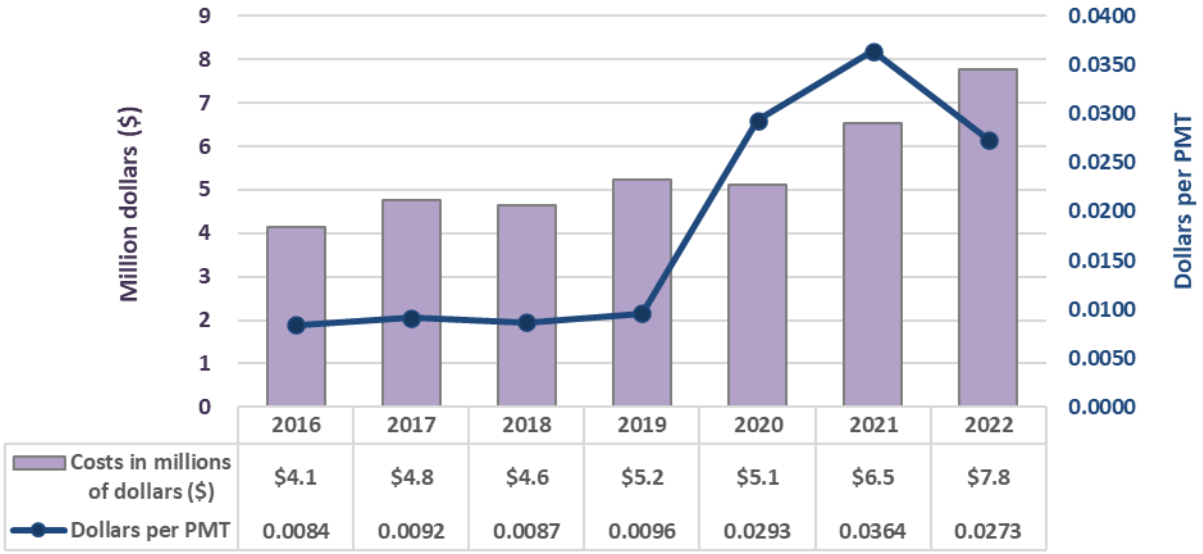
- Since the 2011 baseline, agency utility costs have increased by 213%.
- Relative to 2018, utility costs have increased by 68%.
- From 2021 to 2022, utility costs increased by 19%.

Table 5. Change in Utility Costs

	Change 2011-2022 (Absolute)	Change 2021-2022 (Absolute)
Traction power electricity costs	+501%	+40%
Facility electricity costs	+83%	-8%
Facility natural gas costs	+196%	+51%
Water costs	+13%	+2%
Waste, recycling, and compost costs	+9%	+6%
Combined Utility Costs	**213%**	**19%**

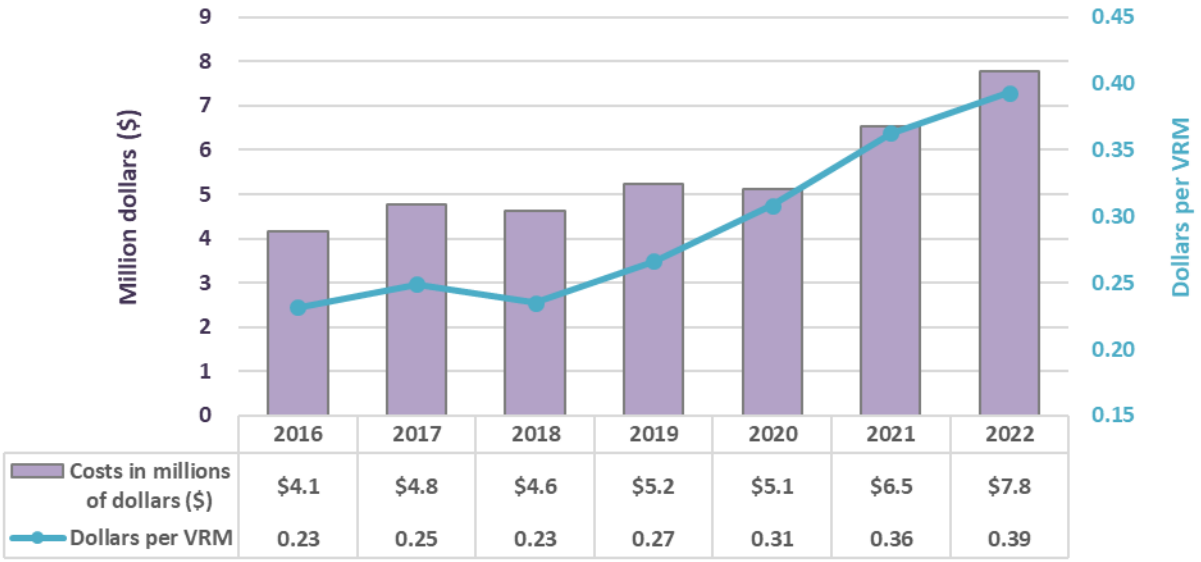
Utility expenses for electricity, water, and waste have increased over time in line with usage trends. Figure 23 below shows the change in resource costs over time. Total facility electricity costs since 2011 have increased by 83%, and waste costs have increased by 9%. Water costs have increased by 13% during that period but experience inter-annual volatility. The agency's fuel expenses have fluctuated with the volatility in petroleum prices, while other resource costs have increased more steadily.

Figure 24. Non-Vehicle Utility Costs (Normalized by Passenger Miles Traveled)



Note: Stormwater and sewer costs are not included.

Figure 25. Non-Vehicle Utility Costs (Normalized by Vehicle Revenue Miles)



	2016	2017	2018	2019	2020	2021	2022
Costs in millions of dollars ($)	$4.1	$4.8	$4.6	$5.2	$5.1	$6.5	$7.8
Dollars per VRM	0.23	0.25	0.23	0.27	0.31	0.36	0.39

Appendix B – 2022 Sustainability costs and savings

The table below summarizes a sample of costs and savings from resource conservation projects completed as of the end of 2022. This data captures many significant monetary costs and savings. However, projects may have additional sustainability benefits that cannot be represented as financial savings – from reduced maintenance cycles to improved air quality.

Note that the savings figures below do not include labor and material cost savings related to improved operations and maintenance efficiency. Payback year estimates reflect applicable grants and or rebates. Many projects with long payback periods still incur significant labor and material cost savings and reduce the frequency of maintenance.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2022 SAVINGS	SAVINGS TO DATE, 2022	PAY-BACK YEAR	DESCRIPTION
ST Express mid-day bus storage	2008	$0	$213,757	$2,339,021	2008	This program allows Pierce County buses to stay in Seattle until the afternoon commute to avoid driving back empty.
Sounder automatic engine start-stop system	2009	$230,596	$232,085	$1,597,708	2013	This equipment was installed to shut down Sounder commuter rail engines when not in use and reduces engine idling time by about 34 percent and significantly reduces air pollution.
Sounder Lakewood-Seattle wayside power	2010	$490,000	$161,749	$1,343,327	2015	Electric wayside power units are used instead of the commuter rail locomotives' diesel engines to heat and power coach cars during layovers, reducing diesel use and air pollutant emissions. Wayside units were installed in Tacoma in 2010 and were then moved to Lakewood in 2013, where more units were added.
Sounder Everett-Seattle wayside power	2011	$315,000	$12,196	$278,285	2024	
Central Link OMF sewer deduct meter	2012	$2,600	$28,679	$350,669	2012	This Central Link light rail Operations and Maintenance Facility meter reduces water costs by accounting for irrigation water that does not enter the wastewater stream.
Union Station HVAC controls upgrade*	2013	$405,778	$25,581	$230,374	2022	The agency upgraded the controls for the Union Station Heating, Ventilation and Cooling (HVAC) system.
Federal Way Transit Center garage lighting upgrades*	2013	$579,334	$32,436	$292,098	2023	Three transit facility garages were retrofitted for LED lighting. These locations included Federal Way Transit Center, Kent Sounder station and Auburn Sounder station.
Kent Station garage lighting upgrades*	2013	$99,773	$5,766	$51,928	2022	
Auburn Station garage lighting upgrades*	2013	$208,985	$11,533	$103,857	2023	

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2022 SAVINGS	SAVINGS TO DATE, 2022	PAY-BACK YEAR	DESCRIPTION
Angle Lake Station solar power	2016	N/A – Installed as part of Design Build project	$1,558	$9,309	N/A	14 KW solar array system on the Angle Lake Station platform canopy and 50 KW solar array system on the Angle Lake Garage pedestrian walkway. These solar panels were installed in the original design build contract for the facility.
Angle Lake Garage solar power	2016		$3,621	$21,871	N/A	
Kent Station lighting upgrades*	2017	$169,849	$10,210	$58,826	2030	Kent, Sumner and Puyallup Stations were upgraded with LED lighting.
Sumner Station lighting upgrades*	2017	$138,967	$10,250	$59,057	2027	
Puyallup Station lighting upgrades*	2017	$169,849	$10,622	$61,200	2029	
OMF interior and exterior LED lighting and EMS controls upgrade*	2018	$1,065,415	$70,944	$340,531	2027	The building control system was upgraded at the Operations and Maintenance Facility, which allows for improved building mechanical operations. The inefficient lighting was replaced with LED in the maintenance shop and exterior parking areas.
Mukilteo Parking Lot lighting upgrades	2018	$13,150	$3,558	$16,328	2021	Parking lot lighting was retrofitted with LED lights near Mukilteo Station.
Issaquah Transit Center lighting upgrades*	2018	$161,514	$8,921	$40,841	2035	Lighting was upgraded to LEDs at the Issaquah Transit Center, Mercer Island Park & Ride, and King St. Stations from parking garages and station platforms to area lighting.
Mercer Island Park and Ride lighting upgrades*	2018	$191,424	$8,402	$38,212	2039	
King St. Station lighting upgrades*	2018	$245,262	$4,966	$19,878	2066	
Sounder Yard solar power	2018	N/A - Installed as part of Design Build project	$196	$989	N/A	2.1 KW solar array system on the Sounder Yard facility. These solar panels were installed in the original design build contract for the facility.
Light Rail vehicles lighting upgrades	2019	$137,022	$16,837	$64,626	2025	Interior lighting and headlights on Link Light Rail were upgraded to LED, which reduced lighting energy use by 45%. The project also improved visibility and reduced maintenance requirements for the lighting system.
Light Rail vehicles oil-less compressors	2019	$650,100	$32,034	$114,971	2040	Compressors on 62 Link Light Rail vehicles were upgraded with oil-less compressors as part of their lifecycle replacement. The new compressors do not use any oil, reduce maintenance costs and improve reliability.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2022 SAVINGS	SAVINGS TO DATE, 2022	PAY-BACK YEAR	DESCRIPTION
Edmonds Station Parking Lot lighting upgrades	2019	$7,620	$1,577	$5,789	2024	Facilities retrofitted (24) 250 watt metal halide parking lot lights with 100 watt LED lights. The new lights use 60% less energy and require significantly less maintenance.
Angle Lake Garage irrigation controls	2020	$1,903	$214	$589	2029	Installed smart irrigation controls at four locations.
Everett Sounder Station irrigation controls	2020	$2,562	$403	$1,110	2027	
Issaquah Transit Center irrigation controls	2020	$2,642	$1,307	$3,047	2022	
Mercer Island Park and Ride irrigation controls	2020	$7,363	$1,301	$2,926	2026	
Lynnwood Warehouse lighting upgrades	2020	$52,606	$4,489	$9,138	2028	Replaced interior and exterior linear fluorescent and metal halide lighting with LED.
Beacon Hill Station deduct meter	2020	$533	$476	$1,390	2021	This meter reduces water costs by accounting for irrigation water that does not enter the wastewater stream.
OMF East solar power	2021	N/A - Installed as part of Design Build project	$12,886	$23,045	N/A	100 KW solar array system on the OMF East roof. These solar panels were installed in the original design build contract for the facility.
Union Station Security Operations Center rooftop HVAC unit	2021	$390,329	$22,344	$25,160	2038	Added a dedicated rooftop HVAC unit to the security operations center at Union Station, which operates 24/7. This part of Union Station was previously served by the main building's HVAC, which can now be placed on a more efficient schedule.
Angle Lake Garage irrigation controls - phase 2	2021	$5,160	$1,187	$1,880	2026	Installed flow sensor and master valve. Upgraded irrigation controller.
Bonney Lake Park and Ride irrigation controls	2021	$5,926	$617	$972	2031	Upgraded master valves, flow sensors and controllers at four locations.
Kent Garage irrigation controls	2021	$4,346	$435	$579	2031	

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2022 SAVINGS	SAVINGS TO DATE, 2022	PAY-BACK YEAR	DESCRIPTION
Union Station irrigation controls	2021	$3,006	$608	$810	2026	
Central OMF irrigation controls	2021	$11,000	$2,204	$2,753	2026	
Mt Baker Station deduct meter	2021	$533	$1,786	$4,520	2021	This meter reduces water costs by accounting for irrigation water that does not enter the wastewater stream.
Airport Station LED lighting	2022	$95,189	$8,666	$8,666	2033	Retrofit existing lighting with LED lighting.
Tukwila International Blvd Station LED lighting	2022	$182,260	$8,066	$8,066	2045	
OMFE irrigation controls	2022	$1,929	$4,234	$4,234	2022	Completed a central control upgrade.
Tacoma Link OMF irrigation controls	2022	$1,929	$176	$176	2033	
Othello Station irrigation controls	2022	$4,125	$740	$740	2028	Installed smart controller and completed a central control upgrade.
Puyallup Station irrigation controls	2022	$2,434	$976	$976	2025	
Mukilteo Station irrigation controls	2022	$2,434	$179	$179	2035	
Federal Way Transit Center irrigation controls	2022	$2,434	$579	$579	2026	
Roosevelt Station deduct meter	2022	$533	$357	$357	2023	These meters reduce costs by accounting for irrigation water that does not enter the wastewater stream.
University District Station deduct meter	2022	$533	$493	$493	2023	

* Cost savings figures for projects implemented through an Energy Performance Contract (denoted with an *) represent average, annualized savings based on the project's projected lifetime savings. These projects may ultimately achieve more energy and cost savings than the guaranteed amount.

Appendix C – 2022 Key Performance Indicators

The table below presents the Key Performance Indicators (KPIs), as defined in the 2019 Sustainability Plan. The table also shows the KPIs in relation to their associated Priorities, Long-term goals and Short-term goals, per the Sustainability Plan. The KPIs reflect current progress compared to the 2019 Sustainability Plan's baseline year of 2018. Note that the KPIs below are a subset of the 2019 Sustainability Plan's metrics.

PRIORITY	LONG-TERM GOALS	SHORT-TERM GOALS	KEY PERFORANCE INDICATOR	2018 BASELINE VALUE	2022 VALUE AND/OR PERCENT CHANGE
People	Social equity addressed and implemented as an agency value	Contribute to a revolving loan fund for affordable housing revolving loan fund	# of dollars contributed to affordable housing revolving loan fund	Contributions began in 2019	$4 million
		Build staff awareness and capacity to integrate equity into all business lines	% of staff trained in equity and inclusion	37% of staff trained	• 95% of staff completed Equal Employment Opportunity Training • 78% of staff completed Implicit Bias Training • 48% of staff completed Inclusion Training • 11% of staff completed Microaggressions in the workplace training
		Meet or exceed workforce diversity goals for construction contractors Goals: • 21% people of color • 12% women • 20% apprentices	% of hours worked by diverse communities on ST job sites	• 29% by people of color • 7% by women • 20% by apprentices	• 36% by people of color • 8% by women • 18% by apprentices
	All staff champion sustainability	Certify key staff to green design and building management professional accreditations	# of staff trained to sustainable professional accreditations	• 22 new Envision Sustainability Professionals • 17 new LEED Accredited Professionals • 5 other new sustainability certifications	• 47 Envision Sustainability Professionals • 11 LEED Accredited Professionals • 12 other sustainability certifications

PRIORITY	LONG-TERM GOALS	SHORT-TERM GOALS	KEY PERFORANCE INDICATOR	2018 BASELINE VALUE	2022 VALUE AND/OR PERCENT CHANGE
Planet	Achieve carbon free operations	Reduce greenhouse gas emissions by 10 percent	% change in greenhouse gas emissions	66,230 tonnes of CO2e	50,188 tonnes of CO2e; 24% reduction since 2018*
			% change in criteria air pollutants	• Particulate Matter: 11,078 lbs • Volatile Organic Compounds: 15,485 lbs • NOx: 399,828 lbs • CO: 193,411 lbs • SOx: 9,986 lbs	• Particulate Matter: 8,689 lbs; 22% decrease since 2018* • Volatile Organic Compounds: 13,222 lbs; 15% decrease since 2018* • NOx: 394,036 lbs; 1% decrease since 2018* • CO: 196,181 lbs; 1% increase since 2018* • SOx: 8,956 lbs; 10% decrease since 2018*
		Increase production from solar panels to 750 KW	# of kW of renewable energy production	• 76,257 kWh produced • 2.1 KW installed	265,161 kWh produced
		Purchase available cost-effective, carbon-free electricity	% change in renewable electricity procurement	85% electricity from clean and renewable sources	90% electricity from clean and renewable sources in 2022; 6% increase since 2018
		Decrease total energy use 5 percent for all facilities built before 2018	% of facility energy reduced	26,910,384 KBtu	27,008,383 KBtu; 0% reduction since 2018*
	Enhance ecosystem functions	Achieve 100 percent environmental compliance (zero fineable violations)	# of fineable environmental compliance violations	Four	Zero
		Reduce total water use by 10 percent at all existing facilities and sites established before 2018	% change in agency water use	27,521 CCF used	24,134 CCF used; 12% decrease since 2018

PRIORITY	LONG-TERM GOALS	SHORT-TERM GOALS	KEY PERFORANCE INDICATOR	2018 BASELINE VALUE	2022 VALUE AND/OR PERCENT CHANGE
Prosperity	Build resilience to climate change and natural or manmade disasters	Develop staff awareness of individual roles in emergency prepared	% of staff trained in emergency preparedness	Training began in 2019	• 1,050 staff trained in core safety training • 173 staff attended safety lunch and learns • 187 staff trained in a non-revenue vehicle safe driving course • 38 staff certified in First Aid/CPR/AED • 85 staff trained in Stop The Bleed
		Conduct a Climate Vulnerability Assessment as part of each major system capital expansion project	% of projects that include Climate Change Vulnerability Assessments	Assessments began in 2019	100% of eligible projects
	Maximize operational efficiency	Divert 50 percent of office waste to recycling or compost	% of waste diverted	35%	35%*
		Include green methods or features in at least 75 percent of all new agency procurements	% increase in # of and dollar value of procurements	• 15% of new procurements • $299M in value	• 55 procurements; 10% of procurements – 20% decrease in number of procurements since 2018 • $663M in value – 121% increase since 2018

* Key Performance Indicator was significantly impacted by reduced ridership, reduced resource use from service reductions, and/or employee's working remotely due to the COVID-19 pandemic.